Innovation Strategy 2021

electricity north west

Bringing energy to your door

Contents

Introduction

Welcome to our innovation strategy which sets out the challenges we face, our approach to using innovation to address these challenges, and the principles and themes that guide our thinking and the development of innovation projects. The strategy outlines our approach to engagement with stakeholders, including how to get involved in helping us with ideas and delivery of our plans. We expect RIIO-ED2 to be a crucial period in the transition of our network to net zero, and we have set out our future vision for innovation over this period and how our innovation activities can support this transition.

This strategy and you

We have a large amount of background information which underpins our strategy and have cross-referenced this throughout the document for those who wish to know more. This strategy is therefore light on background and rich in what we believe is important to you – our innovation stakeholders. Of course, the final say is yours, and as well as our planned engagement and consultation, we have included a survey at the end of the document through which you can provide your feedback. We will review all feedback and ensure we address this in future updates of this strategy.

What is innovation for Electricity North West?

Innovation is the 'ideas cauldron' where novel techniques and potential solutions, whether they be technological or commercial, are analysed, developed, trialled and ultimately transformed into practical solutions to deliver a better, zero carbon service for our customers; improve network performance and safety; and deliver ever more efficient ways of working.

Why we innovate

Whether it be in response to external trends, the needs and expectations of our customers, or changes in regulatory and government policy, the need for innovation has never been greater. The UK became the first major economy in the world to pass laws to end its contribution to global warming and bring carbon emissions to net zero by 2050. Here in the North West, we are supporting our stakeholders' desires to go further and faster than the national target and deliver net zero even sooner.

These changes bring with them uncertainty. Uncertainty as to the energy system and the composition and volume of generation and demand, and uncertainty of technology with continued introduction of innovations that have the potential to transform much of what we do. As the distribution network operator (DNO) for the North West of England, it is our responsibility to help meet this challenge by managing uncertainty and leading the way in the energy revolution in the North West.

This is a significant challenge, and it is through targeted and effective use of innovation and subsequent investment in energy needs that we will help the North West to decarbonise, pave the way for the growth of renewable energy and support the transition to distribution system operation (DSO) – an industry-wide initiative to drive the changes needed to achieve net zero carbon emissions in the UK. But it does not stop there, we must also continue to improve the ways we operate and maintain our network, improve our efficiency and protect the environment and the needs of our consumers in vulnerable circumstances.

Innovation extends across all areas of our business and this strategy looks to facilitate our delivery of many of our other key strategies, thus forming an integral part of our overarching business plan.

Our approach to innovation and our priorities

This strategy describes how innovation will help to address the challenges of energy system transition, while maintaining a safe and reliable network and ensuring that the most vulnerable in our communities can benefit from changes we make elsewhere in the energy industry.

We outline the five principles that support our innovation decision-making; our innovation themes, which ensure our plans are aligned with those across the energy industry and supported by stakeholders; and our innovation life cycle, which ensures we take a fit-for-purpose approach to delivering our projects and ensuring their rapid transition to business as usual.

Building on what we do best

Our track record on innovation is industry-leading, as evidenced by our CLASS project, which is delivering significant savings for customers, and Smart Street, where we are one of only two distribution licensees to be granted funding from the Ofgem Innovation Rollout Mechanism (IRM). So far in ED1 we have used our end-to-end project management process for the successful delivery of 18 completed projects in addition to 11 which are currently underway. In the last five years, we have invested over £32.9 million and have successfully transitioned many of our projects into business as usual (BAU). Transformational projects such as CLASS, Smart Street and Oil Regeneration have delivered millions of pounds of benefits for customers already. We will continue to invest and build on these successes as we look forward into our next price review period beginning in 2023 (RIIO-ED2).

A stakeholder-led approach

An important driver for us is to understand and respond to the needs of our customers and wider energy stakeholders. Working together is the core of our company purpose – engaging with our stakeholders on innovation, collaborating, sharing learning and listening and acting on what we hear is vital to our success. We know that we can only be successful when we deliver outcomes that are valued by the communities we serve.

We hope this document will help you understand how innovation supports our plans for the future of our network. If you have any comments or feedback, please get in touch.

Steve Cox
Engineering and Technical Director

Tell us what you think

Our short online survey provides an opportunity for you to share your thoughts on our strategy. We are particularly interested in hearing what you think about our innovation themes, which were adopted from the Energy Networks Association's (ENA) Electricity Network Innovation Strategy and will be the five areas of focus for our upcoming innovation projects. We would also like your feedback on our future stakeholder engagement, which is an essential part of our innovation process and is central to the successful delivery of our projects. The questions in the survey are listed below. Please bear them in mind while you are reading the document and, if you have a spare couple of minutes, share your thoughts with us and complete our survey.

Q1 Please rank our themes in order from most to least important to you.

- Consumer vulnerability
- Net zero and the energy system transition
- Optimised assets and practices
- Flexibility and commercial evolution
- Whole energy system

Q2 Are there any other themes you think we should be addressing?

Q3 Are you interested in taking part in any future engagement we might undertake around innovation?

Q4 What is the best format for engagement going forward (online survey, interactive panel, focus group, other)?

Q5 In your view, how best can we engage individuals to ensure we obtain the most beneficial response to develop our strategy?

Q6 Do you have any other general comments on the strategy or what you would like to hear about in future?

Who we are

Electricity North West Limited is one of 14 electricity DNOs in Great Britain. We are responsible for maintaining and upgrading 56,000km of network and nearly 500 major substations across the region. We supply electricity to the diverse communities in the North West of England which extends from Macclesfield all the way up to Carlisle.

We are regulated by the Office of Gas and Electricity Markets (Ofgem) who provide DNOs with their license to operate and decide what's fair for us to charge our customers for each price control period.

Our current price control began in 2015 and runs to 2023 and is referred to as RIIO-ED1. This stands for Revenue = Incentives + Innovation + Outputs, Electricity Distribution 1. Under this framework, the price we can charge our customers is fixed until the next price control, RIIO-ED2, which will run from 2023 until 2028.

Work is already underway to set the framework for RIIO-ED2, which will apply to all electricity distribution network companies. The framework will determine what RIIO-ED2, which begins on 1 April 2023, looks like.

RIIO-ED2 will see significant change in the way electricity is generated, consumed and stored, driving innovation across the whole energy system both now and into the future. This will include an important transition in our role, from DNO to DSO.

The transition to DSO is not one activity but rather the delivery and co-ordination of a range of functions. Our DSO transition plan, which is currently under construction, will cover the three broad roles of planning and network development, network operation and market development.

Our strategy

To ensure we target our innovation resources appropriately across the full range of current and future challenges, and our stakeholders have visibility of the areas on which we are focused, we have forged our innovation strategy and associated plan around three core challenges facing distribution network operators: the energy system transition (where passive networks become increasingly active), asset management (further optimising our use of existing assets), and vulnerability (ensuring everyone benefits from our innovation and that no one is left behind).

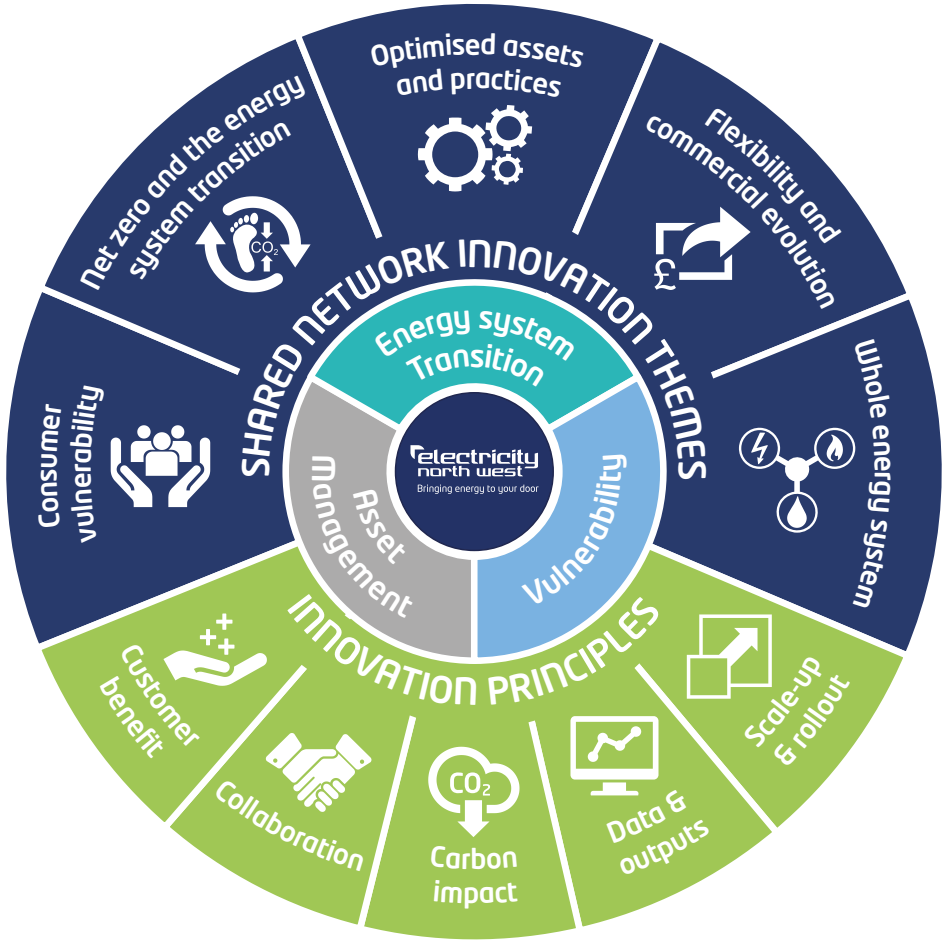
Each of our innovation projects seek to explore a range of technological and commercial issues and trial solutions to one or more of the problems associated with each of the three key challenges.

The shared network innovation themes, as outlined by the ENA in the Electricity Network Innovation Strategy and which we have adopted here, are the five areas of focus for all eligible innovation projects. Identified with the help of industry stakeholders through active engagement, and adopted by Ofgem in their plans for RIIO-ED2, they provide shared strategic direction across the whole industry. They provide a means of categorising and tracking investment in innovation, and help innovators and others to understand how they can collaborate with us by setting out clearly and consistently the purpose of the innovation. Each of our innovation projects will cover one or more of these themes, and we will endeavour to maintain a balanced portfolio of projects across all areas.

Finally, to further ensure our innovation projects are aligned with the needs of stakeholders, and that deliverables are communicated in a manner consistent with our industry peers, our five innovation principles are the pillars which underpin all of our innovation projects.

This document will provide more detail on our innovation strategy, as well as information on how to get in touch with us and become involved in helping us deliver on our plan.

OUR STRATEGY AT A GLANCE



Our challenge

Our target areas

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, while 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 is in these areas that we aim to focus our innovation efforts.

For the purposes of thinking about innovation, the challenges can be split into three broad areas:

OUR CURRENT CHALLENGES

Energy system transition

Asset management

Vulnerability

Energy system transition

The energy system transition is the change from energy use based on centralised sources using mainly fossil fuels to that based on decentralised sources and demands which are environmentally and socially sustainable.

The transition will result in a network originally designed for passive energy flows increasingly operating in a much more active way with power flowing in both directions. This change, along with the predicted increase in customers' demand for electricity from the adoption of low carbon technologies (LCTs), requires us to rethink the way we operate the network, the technologies we use and how we interact with those customers. We believe innovation is a key tool in our investigation of these new methods and ensuring we deliver for customers.

Key enablers for energy system transition are our net zero, DSO and digitalisation strategies, incorporating techniques such as demand response, intermittent generation, storage, interconnection and consumer choice.

Net zero

In 2019 the UK became the first major economy to legislate for the target of net zero greenhouse gas emissions by 2050. A significant part of this journey is the revolution of our electricity industry – the way energy is generated, stored, transported and traded.

Here in the North West, local leaders have set more challenging targets to achieve net zero. It is our job to support these ambitious plans; the way we will do that is set out in our Leading the North West to Zero Carbon strategy.

As our national and regional targets drive the decarbonisation of heat and transport, more customers will change from passive consumers to become 'prosumers' who can generate, store or sell electricity. Others will rely on the network more than ever before to heat their homes and charge their electric vehicles (EVs).

Distribution system operation (DSO)

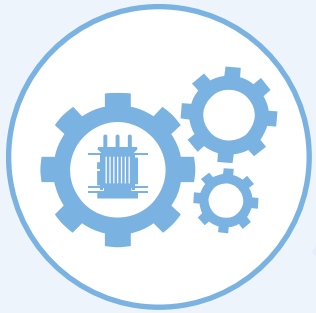
Delivering DSO functions is a key enabler to making net zero affordable. These functions are at the heart of a more active regional electricity network, fit for the changing ways customers produce and consume energy. To facilitate this, we have published our DSO Strategy, which sets out the key activities we are taking to achieve our net zero targets.

Digitalisation

Our Grid Digitalisation and Data Strategy states: "In order to manage the increasingly uncertain energy flows on the network, it is essential that key network parameters such as voltage and power flow magnitude and direction at critical points in the network are measured in real time. Consequently, key enablers for the energy system transition include many additional network energy and voltage measurement points, advanced communications technology and enhanced automatic control capabilities."

This strategy sets out how innovation can facilitate this and how we are implementing the recommendations of the Energy Data Taskforce (EDTF).

Asset management



A key responsibility of a DNO is to operate and maintain apparatus, such as cables, transformers and switchgear, which make up the electricity network. It is, therefore, right that this area forms part of our innovation portfolio and 'optimising the use of our existing assets' has been central to our innovation strategy for several years.

We can further divide asset management into 'safe and efficient network' and 'reliability and resilience'.

Safe and efficient network

A further challenge for the electricity industry is the management of an ageing asset base.

Most of our assets were installed in the 1950s and 1960s and many are approaching their designed end of life. To avoid large peaks in asset replacement programmes, which is both unaffordable and impossible to deliver effectively, we need to investigate alternative ways of managing this ageing asset base, particularly as they are increasingly being asked to perform new functions owing to changes in the needs of our customers.

Reliability and resilience

The energy system transition will mean customers becoming more reliant on the electricity network for heat and transport, increasing the importance of a reliable and resilient network.

Delivering these higher reliability levels and safe and efficient performance from the ageing asset base will require innovation in active network management, energy management, active automation systems, fault detection and repair technologies.

Vulnerability

Vulnerability from the perspective of a consumer of electricity is defined as one who is significantly less able than a typical consumer to protect or represent their own interests and/or significantly more likely to experience detriment, or for that detriment to be more substantial.

The energy system transition of the electricity network could, without action, lead to our more vulnerable customers being left behind, or otherwise disadvantaged, if they are unable to access the new technologies and innovative services available, and therefore take advantage of lower tariffs or improved reliability.

We need to ensure that the most vulnerable in our region are not disadvantaged or excluded from the benefits of the developments we and others make in the energy sector.

Our themes

To ensure our innovation activities are focused on the areas identified as most important by our stakeholders, we have adopted the five innovation themes outlined in the ENA's national strategy. Each of our projects will tackle one or more of these themes.

For the ENA, these themes provide shared strategic direction, a means of categorising and tracking investment, and help innovators understand how they can collaborate with us.

Below, we explain what each of these themes means to us and set out how we will work to address them through our innovation projects.

OUR THEMES

- Consumer vulnerability
- Net zero and the energy system transition
- Optimised assets and practices
- Flexibility and commercial evolution
- Whole energy system

Consumer vulnerability

Aim:

to support the needs of consumers in vulnerable circumstances today and in the future, and ensure that everyone can experience the benefits of the energy transition and any adverse effect of change is minimised.

How we will deliver:

we want to ensure consumers in vulnerable circumstances everywhere are able to share fully in the benefits of all of our innovations, which is why we have made this one of our six innovation commitments. We will carry out a customer impact assessment for every innovation project to ensure that benefits are available to all customers and those in vulnerable circumstances are not adversely affected. We will publish these as part of our project registration document. As informed by our stakeholders, we will collaborate with other DNOs to ensure that our innovations are replicable and offer best value for customers. We will also partner with relevant organisations to facilitate wider learning, and will construct proactive practices to meet the needs of consumers in vulnerable circumstances.

Net zero and the energy system transition

Aim:

to facilitate and accelerate the UK's transition to net zero greenhouse gas emissions before 2050.

How we will deliver:

as the UK continues to transition to net zero, the ways in which different customers use electricity and electrical networks will need to keep pace, resulting in significant changes to our network. We will manage the uncertainty associated with these changes through our innovation projects. We will carry out a carbon impact assessment for every innovation project, which will be published as part of our project registration document, and will only take on those which contribute to our net zero target.

Optimised assets and practices

Aim:

to develop and implement industry-leading techniques for optimising assets and practices for energy networks.

How we will deliver:

we will evaluate our asset management and operating practices to ensure that we are working as efficiently and reliably as possible, while improving safety and our impact on the environment. We will make every effort to maximise the use of our existing assets by combining innovative ideas with new technology, for example, by avoiding reinforcement through the use of flexible services. We will identify innovation projects that seek to address one or more of these objectives and work with relevant partners to design and trial the new technologies or processes and move these into business as usual. A great example of this is our Sentinel NIA project.

Flexibility and commercial evolution

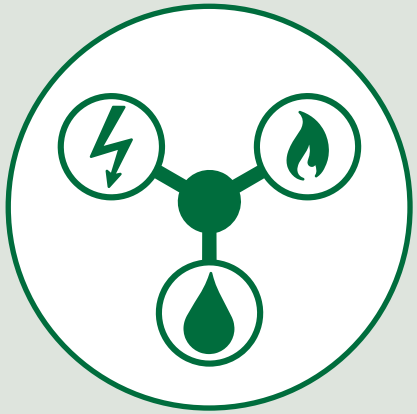
Aim:

to develop and test innovative solutions to increase the flexibility, transparency and efficiency of the energy system, enabling information to be more open and networks to be more responsive to change.

How we will deliver:

building on our success with C2C and CLASS, we will continue to spearhead meaningful change in this area. As flexibility markets continue to develop it is essential that we ensure these markets are accessible to our customers and we can identify and remove any barriers to flexibility.

Whole energy system



Aim:

to enable joined up and efficient approaches across multiple aspects of the energy system around planning, forecasting, design, construction, operation, maintenance and data.

How we will deliver:

to ensure that we play our part in the energy system transition effectively, we will develop our understanding of how we impact on, and interact with, the wider energy system. We will collaborate on projects with other utilities, such as gas and telecoms, to ensure the best value for customers when transitioning to net zero. This will include new processes for standardisation and whole system co-ordination.

Our principles

To ensure our innovation projects are aligned with the needs of stakeholders, and that all deliverables are communicated in a manner consistent with our industry peers, our five innovation principles are the pillars which underpin all of our innovation projects.

These principles influence our innovation decision-making process, guiding how we choose which innovations to pursue. To ensure consistency across the industry and alignment with the needs and expectations of stakeholders, these principles mirror those of the electricity industry's national innovation strategy, published by the ENA in March 2020.

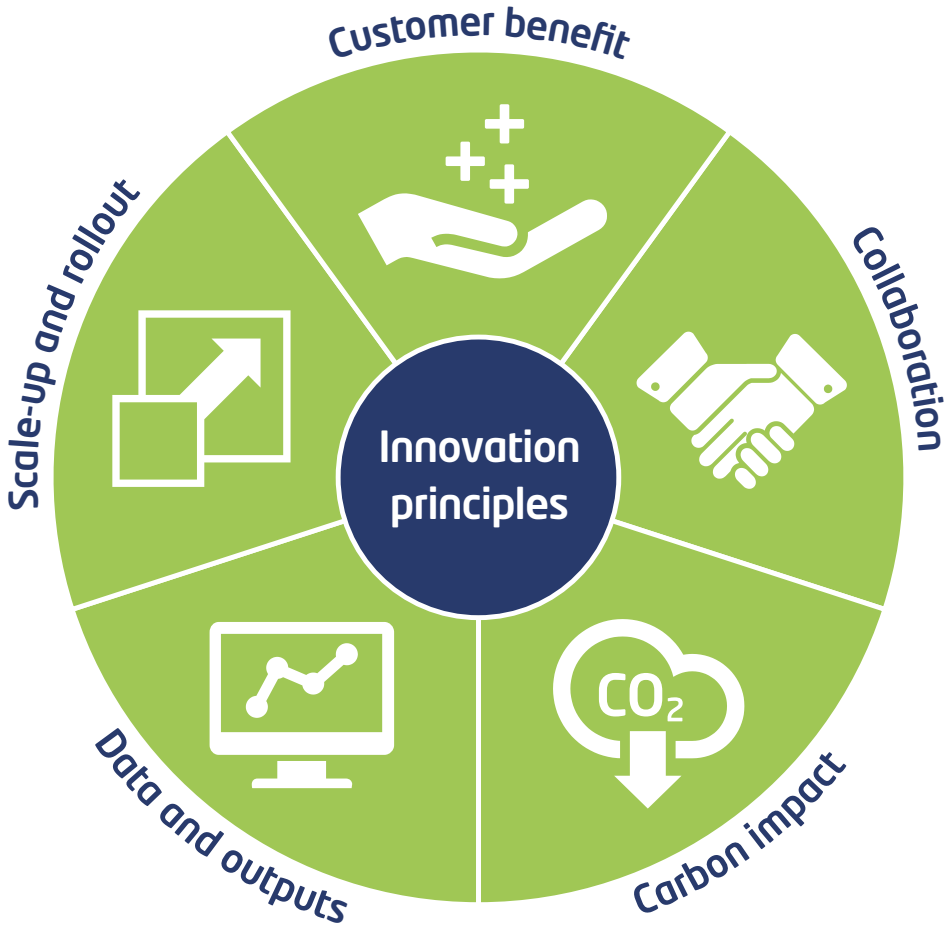
Customer benefit: ultimately, it is the customer that matters and we innovate only to deliver value to customers. Accordingly, all innovation on our network must deliver a clear customer benefit or reduce costs for customers, e.g. through deferred reinforcement.

Collaboration: together we are stronger and can bring together skills and specialisms to address our most challenging of problems. As such, we aim to collaborate with stakeholders, e.g. by working in partnership with other DNOs, across the wider energy sector to maximise the value of innovation for our customers and find solutions to common problems.

Carbon impact: wherever possible, our projects aim to contribute meaningfully to national carbon targets either directly, e.g. by reducing losses or increasing potential LCT connection, or indirectly, e.g. by reducing the potential carbon impact of a project. We have a great track-record here, and we are committed to continuing and strengthening this.

Data and outputs: we know from feedback we must work harder than ever to share the findings from our innovation as soon as possible with our stakeholders. Therefore, we will make all key outputs and learning from our innovation projects available and easily accessible to stakeholders as appropriate, to enable replication and encourage new ideas and learning.

Scale up and rollout: we consider it essential that innovation projects can be implemented at scale, across our network and readily transferred to the wider industry, in a cost-effective manner. As such, rollout – the stage where customers see the value in the innovation – is integral to our decision to proceed with an innovation project. If it cannot be rolled out or is not scalable, we do not consider the project to be ready.



Our commitments

Our innovation commitments are our promise to our customers and stakeholders, and we intend to measure ourselves against these routinely and share our findings publicly. We plan to keep this strategy up-to-date and relevant, deliver against our industry challenges, encourage innovators to come to us, collaborate with external parties, keep our stakeholders up-to-date, facilitate challenge of our innovation programme and speak to the appropriate parties. Each year, working with our innovation oversight panel, we will publish an innovation update report containing, among other things, information on how we are getting on in meeting our commitments.

OUR COMMITMENTS

We will keep our strategy **under regular review**, ensuring that it reflects our priorities and those of our stakeholders	We will ensure that we deliver projects that **tackle the challenges** of energy system transition and vulnerability	We will routinely hold a '**call for innovation**' and encourage innovators to submit their ideas for consideration	We will ensure **collaboration** is at the forefront of all innovation, keeping stakeholders up-to-date and sharing all learning	We will establish an **innovation oversight panel** to routinely review and challenge our innovation programme	We will publish an **annual innovation update** report to provide visibility of how we are meeting our commitments

Innovation at Electricity North West

At Electricity North West, we consider innovation to be a key enabler helping us to meet our broader objectives and to address the challenges facing the electricity industry.

Looking forward into the RIIO-ED2 period, 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 is 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. If you have an idea, please get in touch.

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 transfer to BAU.

INNOVATION LIFECYCLE

Innovation processes and governance

The process of developing our innovation ideas involves senior managers from across our business and ensures projects are highly targeted and linked to real problems that, when solved, will deliver genuine value. We use a dedicated project management team who have significant experience in the delivery of complex innovation projects and programmes and are therefore able to employ best practice to maintain our high standards when guiding our projects from initiation to completion. Our engineering standards team works closely with our innovation team to help guide our strategy and ensure that our innovations are embedded into BAU.

Within Electricity North West, we have undertaken a number of projects where we have developed or tested innovative solutions which, once proven, have been rolled out into BAU. For example, CLASS, Oil Regeneration, Bidoyng Smart Fuse and our Real Options model which is used to help decide the most appropriate solution for a network constraint. To ensure that the transfer to BAU runs as smoothly as possible we engage with the wider business as part of our innovation development process to fully understand and scope the requirements. We also take advantage of the funding available to us, for example through use of the IRM for Smart Street, to ensure that rollout can begin with appropriate speed to deliver the best value for money to our customers.

We continually scan the horizon for innovation projects undertaken by our industry colleagues and stakeholders to ensure that we do not miss an opportunity to include any suitable learning or industry developments into our BAU practices. This is built into our innovation process by way of our continuous involvement with the ENA and other DNOs, as well as through our regular attendance at innovation and dissemination events.

Our innovation projects are subject to a rigorous assurance process to substantiate their predicted costs and benefits. This includes review through our internal audit before an external audit involving a relevant third-party review by a consultant such as Ricardo Energy Consultancy, a strategic review through a body such as Manchester University, or a peer review through the ENA. In the past, we have used Ofgem's Regulatory Instructions and Guidance (RIGs) tables, published on Ofgem's website, to report all benefits as a result of innovation. We also continually monitor and track our innovation spending against our planned project costs.

We have recently worked with the ENA to develop the new innovation process for RIIO-ED2. This is an end-to-end process which will promote collaboration and see the adoption of a new innovation benefits-tracking methodology for all DNOs, which will deliver a wide range of benefits to our customers and wider stakeholders. We will build this methodology into our innovation process, ensuring that we are well-practised in advance of RIIO-ED2.

We adhere to the requirements outlined in Ofgem's project guidance and governance documents when undertaking innovation projects funded by Ofgem, such as the NIC and NIA.

All of our innovation projects must comply with Ofgem's Data Best Practice guidance, an early draft of which was published in January 2020. This guidance aims to provide an overview of Ofgem's overarching expectations around how energy data is best used, will take into account expertise from various perspectives and specialisms, and will be subject to continuous improvement. We will keep up-to-date with this guidance to ensure that we can build it in to all innovation projects.

Stakeholder engagement

Our innovation strategy follows our general stakeholder engagement principles, which ensure that we consult the right stakeholders, in the right way, at the right time, on the right issues. This is an essential part of innovation at Electricity North West and is central to the successful delivery of our projects.

STAKEHOLDER ENGAGEMENT

By utilising the learning from our previous innovation projects, we have developed a broad range of traditional and innovative customer engagement techniques, such as our engaged customer panels, enabling us to articulate complex network issues to our stakeholders, simply and clearly.

We also routinely use a variety of channels to disseminate detailed information about our work to both the industry and our wider stakeholders.

We have carefully established long-term strategic relationships with our partners who provide the technology solutions to meet our customers' needs. We hold regular bilateral meetings with our partners to discuss our overall innovation portfolio and areas where our partners may be able to provide support.

In addition, we have committed to set up an innovation oversight panel made up of key stakeholders, including academia, suppliers, partners, manufacturers and local representatives, to provide oversight of and challenge to our innovation programme. This will involve routine review and assessment of our ED2 plan, review of proposed project scope ahead of registration with Ofgem, annual review and assessment of ongoing and completed projects, and support and guidance on the Strategic Innovation Fund (SIF).

We also share learning from our innovation projects with our colleagues and ask for their feedback and ideas for future projects using internal channels such as our intranet, weekly e-newsletter and internal magazine.

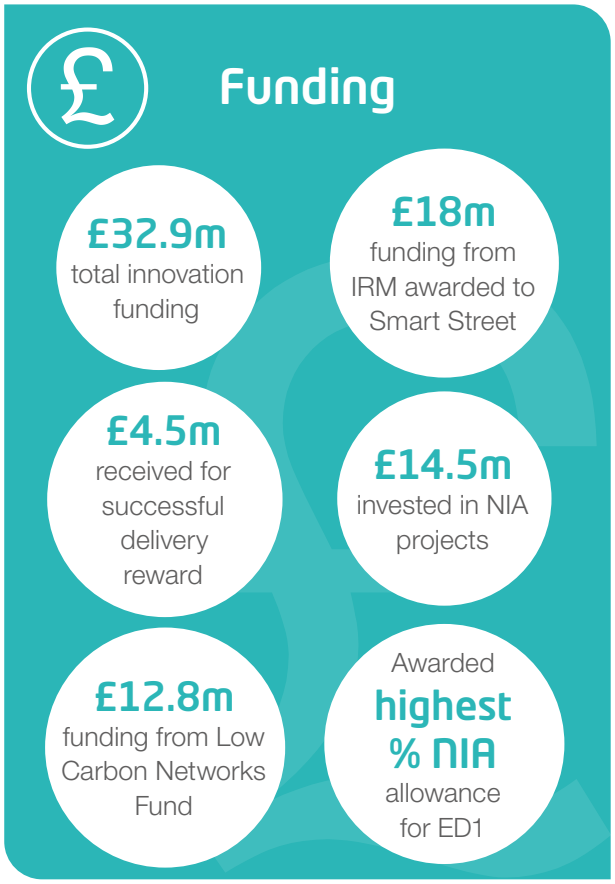
Going forward we propose to hold regular calls for innovation to accompany our ongoing engagement with the ENA's call, which is held annually. We will carefully consider all ideas submitted to us and endeavour to provide feedback to all parties. In addition, any ideas submitted will be treated as confidential and we will respect fully any intellectual property of the originator, regardless of whether we choose to progress with funding.

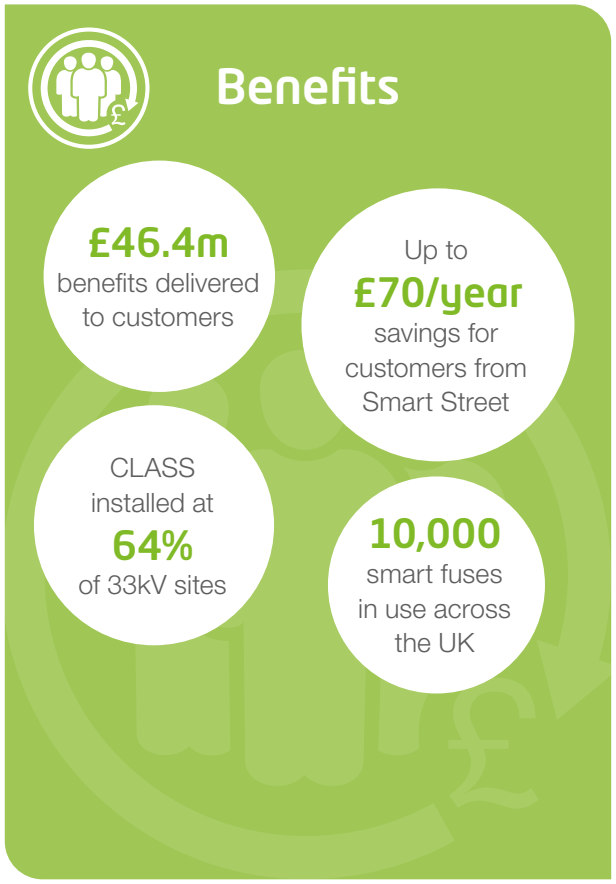
Our track record

At Electricity North West, we are proud of our ability to use innovation to respond to the evolving needs of our customers, and the contributions we have made to promote learning across our industry and beyond.

We believe our track record speaks for itself. We have successfully invested all funding allocated to our innovation projects, delivering £46.4 million of benefits to customers. But there's still a lot more to do as we exit RIIO-ED1 and move into the ED2 period. We aim to build upon our success and supplement this with all that is good from the proven innovation developed by other DNOs.

OUR RECORD OF SUCCESS





CLASS

Our CLASS project successfully demonstrated that by installing cutting edge voltage controllers in our primary substations we can reduce demand for electricity at peak times and defer reinforcement.

Since the successful completion of the project, we have rolled out CLASS technology to 260 primary substations across the North West, benefiting 1.7 million of our customers. We are now able to provide 'balancing services' to National Grid, helping them to balance supply and demand for the whole of Great Britain.

CLASS could save customers in the North West around £100 million over the next 25 years – and £300 million across Great Britain.

Could save customers **£300m** across Great Britain in the next 25 years

Will reduce electricity consumption by **5-8%** per year for up to 45,000 customers

Smart Street

Our Smart Street project trialled innovative voltage control techniques to enable our networks and customers' appliances to perform more efficiently and make it easier to adopt LCTs onto the electricity network.

Starting in 2020, we will install Smart Street technology at 180 distribution substations over a three-year period, targeting areas with a high uptake of LCTs, particularly where these overlap areas of fuel poverty. This will bring benefits for up to 45,000 customers, reducing electricity consumption by 5-8% per year. In the longer term this rollout will save a massive 143,860 tonnes of carbon between now and 2050, the same as removing 2,570 cars from our roads every year.

Oil regeneration

Part of our approach to innovation is to maximise the use of our existing assets by using innovative interventions to prolong the life of electrical assets in our substations.

We are the only network operator with a dedicated oil reprocessing plant in the UK. Based at Whitebirk near Blackburn, the plant recycles 1.5 million litres of oil every year which is used to insulate and cool transformers.

Building on the success of our oil recycling process we pioneered a new, environmentally-friendly approach to regenerating oil which extends the life of our transformers. Our project demonstrated that by recycling the oil in this way we can extend the life of a transformer by 10 – 15 years. This new approach will save around £32 million over a six-year period.

As part of the next phase of research we are looking at the best time to carry out oil recycling in the life of a transformer.

Recycling the oil this way can extend the life of a transformer by **10 - 15 years**

Value of Lost Load

Understanding the impact of power cuts on different groups of customers and the Value of Lost Load (VoLL) is important as it is used by the electricity industry to determine investment strategies and network planning.

Our research shows a huge difference in the way customers value their electricity supply. The under 30s are among the least affected by a power cut whereas the groups most affected include those in vulnerable circumstances, particularly those struggling with fuel poverty. Other highly impacted groups include young families and early adopters of LCTs.

Research shows a huge difference in the way customers value their electricty supply

Our research has demonstrated that the value customers place on the security of their supply has increased significantly to an overall weighted average of £17,500MWh, since Ofgem set the single value for our current regulatory period (RIIO-ED1) at £16,000MWh, reflecting customers' greater dependence on electricity and their evolving needs.

The findings from the VoLL project are expected to inform our investment decisions in the next price review and deliver more efficient decisions. Moving from a single model, to a more nuanced segmented VoLL, will enable DNOs to more effectively calculate the risk and benefits of prioritising particular investment decisions to deliver security of supply. This understanding will also inform restoration strategies following a supply interruption, and the provision of temporary support to mitigate the impact on those most affected.

Our projects

	Project	Funding	Themes					Timescales
			Consumer vulnerability	Net zero and energy system transition	Optimised assets and practices	Flexibility and commercial evolution	Whole energy system	
In progress	QUEST	NIC	●	●	●	●		2020-2025
	Combined Online Transformer Monitoring	NIA		●	●			2014-2022
	Sentinel	NIA	●		●			2015-2022
	Cable Health Assessment	NIA		●	●			2015-2021
	Optimisation of Oil Regeneration	NIA		●	●			2016-2022
	Avatar	NIA	●					2016-2021
	Interface	NIA		●	●			2018-2021
	Artificial Intelligence & Machine Learning	NIA	●	●	●			2018-2021
	Reflect	NIA		●	●	●		2019-2021
	Tapchanger Monitoring	NIA			●			2016-2022
	Intelligent Network Meshing Switch	NIA	●	●	●			2019-2021

	Project	Funding	Themes					Timescales
			Consumer vulnerability	Net zero and energy system transition	Optimised assets and practices	Flexibility and commercial evolution	Whole energy system	
Completed	Celsius	NIC		✓	✓			BAU
	Capacity to Customers	LCNF 2		✓	✓	✓		BAU
	CLASS	LCNF 2		✓	✓	✓		BAU
	Smart Street	LCNF 2	✓	✓	✓			BAU
	Respond	LCNF 2		✓	✓	✓		Transitioning to BAU
	Demand Scenarios with Electric Heat & Commercial Capacity Options	NIA	✓	✓		✓	✓	BAU
	Distribution Asset Thermal Modelling	NIA			✓			BAU
	P2/6 Rewrite	NIA			✓			BAU
	Asset Risk Optimisation	NIA		✓	✓			BAU
	Reliable Low Cost Earth Fault Detection for Radial OHL Systems	NIA	✓	✓	✓			BAU

	Project	Funding	Themes					Timescales
			Consumer vulnerability	Net zero and energy system transition	Optimised assets and practices	Flexibility and commercial evolution	Whole energy system	
Completed	ATLAS	NIA	✓	✓		✓	✓	BAU
	Value of Lost Load (VoLL)	NIA	✓		✓			Transitioning to BAU
	Enhanced Voltage Control	NIA		✓	✓	✓		BAU
	Investigation of Switchgear Ratings	NIA			✓			Transitioning to BAU
	Detection of Islands	NIA		✓		✓	✓	Transitioning to BAU
	Future Network Modelling Functions	NIA		✓	✓	✓		Transitioning to BAU
	Electricity and Heat	NIA		✓		✓	✓	Complete
	VoLL 2	NIA	✓	✓	✓			Transitioning to BAU

Vision for the future

Our track record of delivering innovation has resulted in significant benefits for millions of our customers. By building upon the delivery framework and governance that provided these successes, we will work hard to continue this trend into RIIO-ED2 and beyond.

1. Consumer vulnerability
2. Net zero and the energy system transition
3. Optimised assets and practices
4. Flexibility and commercial evolution
5. Whole energy system

To address our challenges, we have set out several short-, medium- and long-term innovation objectives described below, each categorised by one of our innovation themes. As projects often address multiple themes, we have presented the objectives against a main or primary theme and one or more secondary themes. We will use our innovation investment to create and deliver projects that address these objectives. We are seeking support as appropriate in these areas from a range of stakeholders and we will include more specific information in our RIIO-ED2 business plan. These are presented here as innovation opportunities.

Primary theme	Objective	Opportunities	Secondary themes		
			Short term Remainder of ED1 (up to Mar 2023)	Medium term ED2 (Apr 2023 - Mar 2028)	Long term After ED2 (post Apr 2028)
Consumer vulnerability	**Aim:** to support the needs of consumers in vulnerable circumstances today and in the future, and ensure that everyone can experience the benefits of the energy transition and any adverse effect of change is minimised.				
	Further explore our role in addressing fuel poverty and how technology could provide savings to consumers in vulnerable circumstances	Voltage optimisation for urban and rural customers			
		Explore options for energy efficiency incentives			
	Explore how technology and innovation can mitigate the environmental and societal impact of our operations	Environmentally friendly alternatives for our fleet			
		Reduce our use of open excavations through alternative technologies			
		Explore how technology can be used to improve how customers interact with us			
	Assist with community and local energy schemes	Respond to and resolve technical issues, particularly those associated with islanding and microgrids			
		Support the delivery of other projects e.g. by providing routes to customer engagement and trials			

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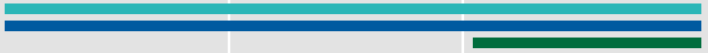
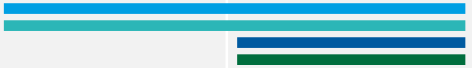
Primary theme	Objective	Opportunities	Secondary themes		
			Short term Remainder of ED1 (up to Mar 2023)	Medium term ED2 (Apr 2023 - Mar 2028)	Long term After ED2 (post Apr 2028)
Net zero and the energy transition	**Aim:** to facilitate and accelerate the UK's transition to net zero greenhouse gas emissions before 2050.				
	Offset the carbon impact of our network	Explore innovative methods to reduce network losses			
	Increase energy efficiency and maximise capacity through use of voltage optimisation	Explore voltage optimisation on overhead line connected rural networks			
		Explore co-ordinated voltage control			
	Facilitate the use of low carbon technologies	Further expansion of connect and manage policies			
		New technologies and techniques to enable the release of capacity			
		Explore the impact of electric vehicles and trial cost effective alternative solutions			
		Explore the impact of heat pumps and trial cost effective alternative solutions			

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Primary theme	Objective	Opportunities	Secondary themes		
			Short term Remainder of ED1 (up to Mar 2023)	Medium term ED2 (Apr 2023 - Mar 2028)	Long term After ED2 (post Apr 2028)
Optimised assets and practices	**Aim:** to develop and implement industry-leading techniques for optimising assets and practices for energy networks.				
	Investigate alternatives to and reduce our use of sulphur hexafluoride (SF_6) in electrical switchgear	Trial converting SF_6 to alternative for existing equipment			
		Trial new assets without SF_6			
		Develop advance leak detection methods and repair of leaks			
	Explore improvements to safety measures for our operators and the general public	Investigate methods to detect unsafe conditions on overhead networks			
		Explore how to reduce the requirement for working at height			
		Investigate further opportunities for live working practices			
		Investigate reducing risk associated with publicly accessible assets			
	Enhance automation across our operations and make use of new technologies to improve network resilience	Investigate new ways to reduce transient faults and short-duration interruptions			
		Improve automation on the low voltage (LV) network			
		Explore methods for control room automation			
	Improve network reliability	Make use of new technologies to mitigate and manage network faults			
	Increase lifespan and improve health of existing assets	Explore further opportunities for oil regeneration			
		Understand the condition of cables to inform asset management			
		Explore options for asset refurbishment to extend life			

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Primary theme	Objective	Opportunities	Secondary themes		
			Short term Remainder of ED1 (up to Mar 2023)	Medium term ED2 (Apr 2023 - Mar 2028)	Long term After ED2 (post Apr 2028)
Flexibility and commercial evolution	**Aim:** to develop and test innovative solutions to increase the flexibility, transparency and efficiency of the energy system, enabling information to be more open and networks to be more responsive to change.				
	Facilitate bringing domestic flexibility into the market	Improve modelling of LV networks and explore commercial models		1, 2, 3	1, 3, 5
	Improve demand and generation forecasting	Investigate the use of time series data as an alternative to worst case scenario modelling	2	1, 3, 5	1, 3, 5
	Guarantee access to our data	Explore and establish methods for sharing data		2, 3, 5	3, 5
		Investigate methods to provide near real time operational forecasting		1, 2, 3, 5	1, 3, 5
	Improve our connections processes	Explore opportunities to improve the customer experience process through automated processes and improved queue management		2, 3, 5	3, 5
	Improve Electricity System Operator (ESO) interface arrangement	Investigate methods for sharing data on a global level		2, 3, 5	3, 5
		Explore methods to facilitate real time operational links to allow a dynamic response to changes on ESO network		2, 5	5
	Improve interface arrangements with other network companies	Investigate solutions to facilitate data sharing to enable better planning and co-ordination		2, 3, 5	3, 5
		Explore methods to match LCTs embedded in an independent DNO network to our substations		1, 2, 5	1, 5

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Primary theme	Objective	Opportunities	Secondary themes		
			Short term Remainder of ED1 (up to Mar 2023)	Medium term ED2 (Apr 2023 - Mar 2028)	Long term After ED2 (post Apr 2028)
Whole energy systems	**Aim:** to enable joined up and efficient approaches across multiple aspects of the energy system around planning, forecasting, design, construction, operation, maintenance and data.				
	Investigate joint use of assets	Collaborate with other utilities to explore opportunities such as communication fibres on poles and shared use of trenches			
	Promote whole system planning and decision making	Explore methods and processes to ensure solutions to decarbonise heat are the most cost-effective for our customers			

Funding and governance

During RIIO-ED1, Ofgem has provided essential backing for innovative projects to make energy networks smarter, accelerate the development of a low carbon energy sector and deliver financial benefits to customers. The projects help develop crucial knowledge and expertise, which is being shared across the industry.

Starting in RIIO-ED2, eligibility for funding of projects should demonstrate long-term value to consumers but are at higher risk of under-delivery by the core RIIO-ED2 framework (e.g. where network companies are required to collaborate, or the benefits accrue to parties beyond the innovator itself).

SOURCES OF FUNDING

Source	Fund	Criteria	Eligible types of project	Typical project value
Ofgem Innovation Stimulus	Network Innovation Allowance (NIA)	• Smaller technical, commercial, or operational projects directly related to the licensee's network that have the potential to deliver financial benefits to the licensee and its customers; and/or • The preparation of submissions to the Network Innovation Competition (NIC) which meet the criteria set out in the NIC governance document	Shorter duration projects, lower technology readiness level (TRL), possible forerunner projects, small-scale demonstration with reasonably rapid turnaround	Under £2m
Ofgem Innovation Stimulus	Network Innovation Competition (NIC)	• For the development and demonstration of new technologies, operating and commercial arrangements • Ofgem will provide funding for the best innovation projects which help all network operators understand what they need to do to provide environmental benefits, reduce costs and maintain security as Great Britain (GB) moves to a net zero carbon economy • Available until 2022	Longer duration projects, higher TRL, large-scale demonstration, prior to BAU adoption	£2m - £20m

SOURCES OF FUNDING

Source	Fund	Criteria	Eligible types of project	Typical project value
Ofgem Innovation Stimulus	Strategic Innovation Fund (SIF)	• Five-year investment programme to transform Britain's energy networks to deliver emissions-free green energy, along with world-class service and reliability • The intention of this investment is to ensure that licensees can deliver clean energy and meet government targets for net zero emissions and help to generate green growth and employment • Available from 2023	Longer duration projects, higher TRL, large-scale demonstration, prior to BAU adoption	£2m - £20m
Other external funding	Sources such as Innovate UK	• Government-backed agency which supports businesses across all economic sections to drive growth by working with them to de-risk, enable and support innovation • They connect businesses to partners, customers and investors that can help them turn ideas into commercially successful products, services and business growth • They fund business and research collaborations to accelerate innovation and drive business investment into research and development	Shorter duration projects, lower TRL, possible forerunner projects, small-scale demonstration with reasonably rapid turnaround	Under £2m
Electricity North West Business Plan	Business as usual funding (TOTEX)	• This funding would come from our baseline TOTEX allowance and would require a specific request for funding, not unlike the IRM • The rollout of innovation proven during ED1 to deliver benefits to customers, including safety, resilience, reliability, carbon and wider environmental benefits • Each project will be assessed on a case-by-case basis	Short-term activities of lower risk considered likely to payback within the ED2 period with an emphasis on operation and maintenance activities	n/a

How to get involved

Please tell us what you think about this document by completing our short online survey. We will routinely review our strategy and your responses will help us to develop and improve our approach to innovation.

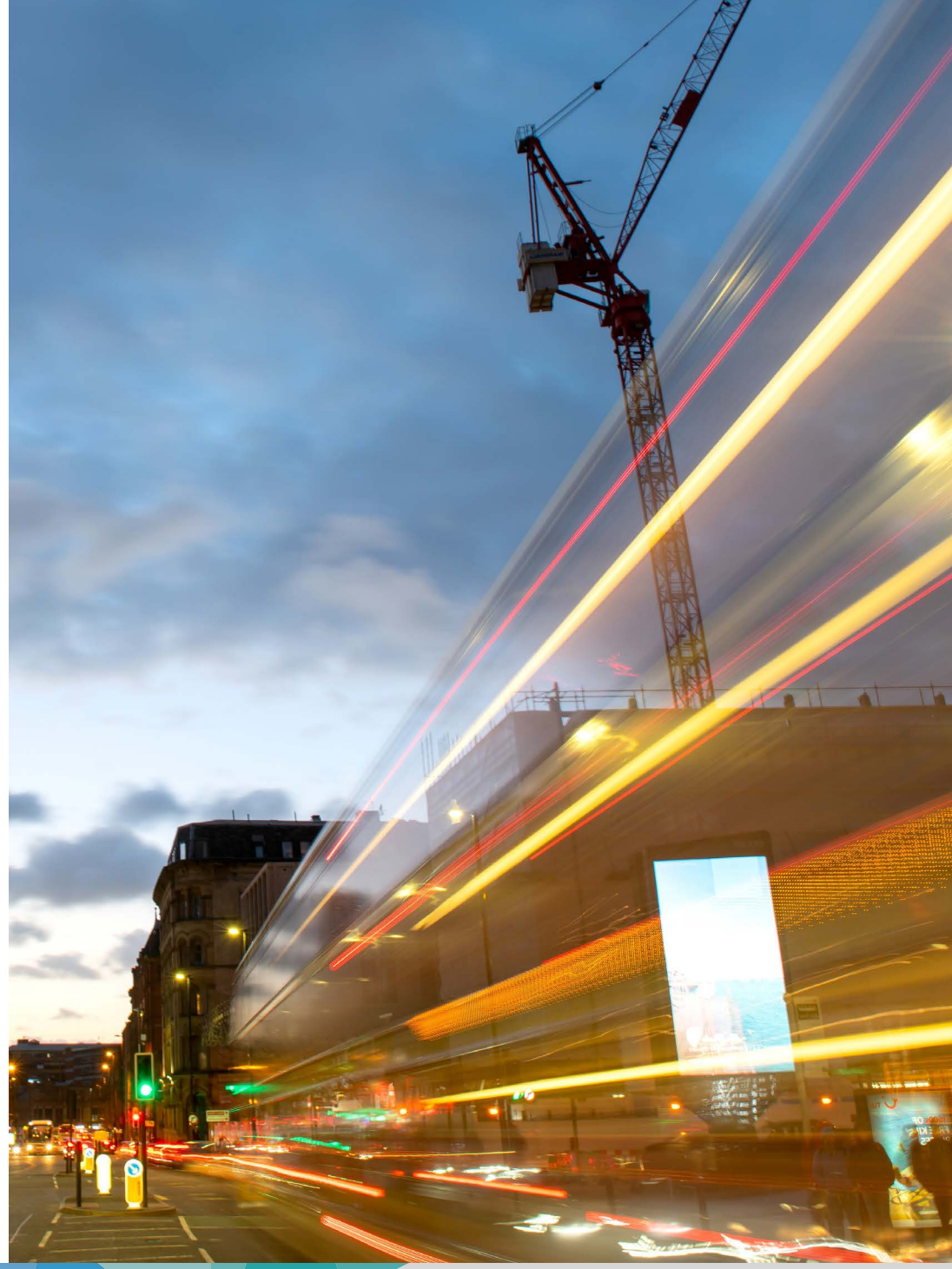
To take part in the survey, please click here.

To widen input into our projects and enrich our portfolio, we issue an annual ‘call for innovation’ to request ideas for projects from as broad a range of stakeholders as possible. Ideas can be submitted direct to our innovation team at dissemination events or to our dedicated mailbox.

If you have an idea for an innovation project or have any questions about our innovation strategy, please email us at: innovation@enwl.co.uk.

To sign up to receive our newsletters and invitations to our events, please sign up here.

To find out more about the work of the Energy Networks Association and collaboration within the industry, please visit the Smarter Networks Portal.



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