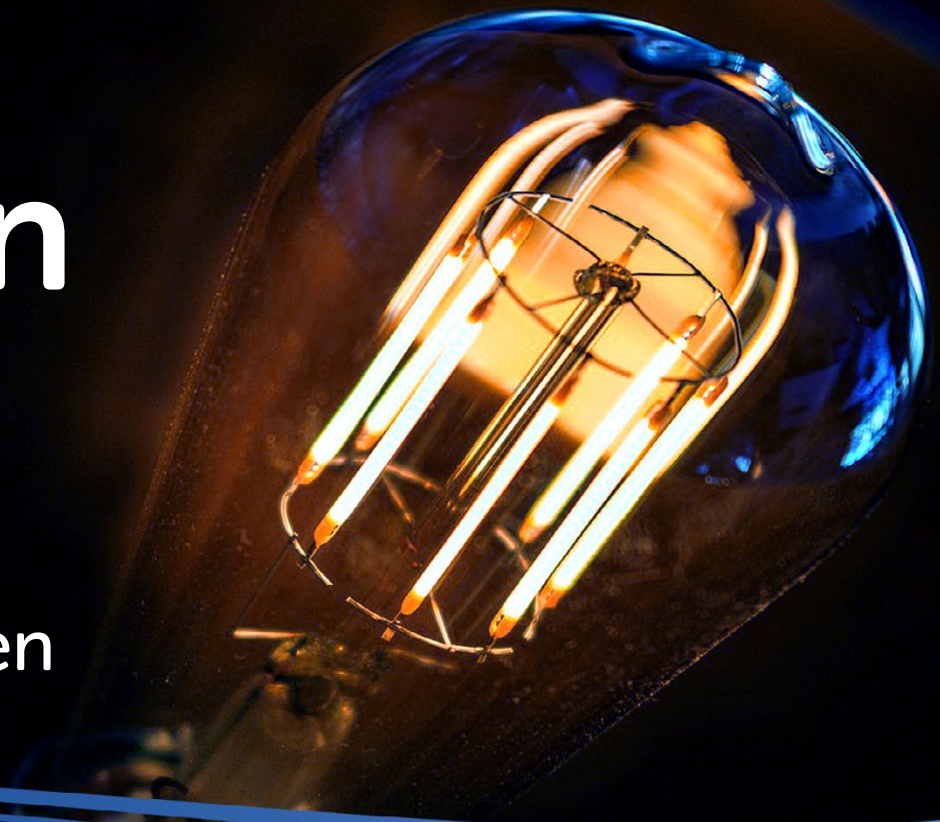
Innovation Strategy

Working together to make innovation happen



Scottish & Southern Electricity Networks | Powering our community

Contents

Foreword

Our Distribution business at Scottish and Southern Electricity Networks (hereafter referred to as SSEN) continues to see first-hand through many of its engagement channels, that our customers are motivated by new technologies, clean air and carbon challenges, commercial propositions and technology efficiencies.

The UK and Scottish Governments have set ambitious targets of net zero greenhouse gas emissions by 2050 and 2045 respectively ('Net Zero'). These policies are driving radical change in how we need to plan, invest and operate our networks.

Our approach to innovation facilitates the trialling, testing and development of new ideas and capabilities. Our approach to innovation and learning by doing will be critical to help deliver the ambitions of our stakeholders and our business.

Our refreshed Innovation Strategy comes at a time when the opportunities and challenges facing electricity distribution have never been greater. Our strategy sets out why we innovate, how we engage with stakeholders, how we develop and deliver our innovation programme and the challenges and areas of focus for the remainder of this price control. Innovation extends across all areas of our business and this strategy looks to facilitate delivery of our key objectives.

Successful innovation projects such as Solent Achieving Value from Efficiency (SAVE) and Low Energy Automated Networks (LEAN) allied to the learnings from unsuccessful ones, provide the building blocks for the future. We have established a range of internal processes which allow us to progress innovation projects from ideas through to implementation.

We want to continue to develop our understanding of the opportunities created by the transition to Net Zero and the proliferation of low carbon technologies for the communities we serve. We are committed to taking an agile approach and with more robust tracking of project benefits to further improve the way we deliver our innovation projects into Business As Usual.

We must work together to make innovation happen to deliver benefits in a timely manner through increased collaboration, with industry partners, government and customers.

If you have an idea or area where you think we should be focusing innovation then we want to hear from you via email futurenetworks@sse.com

Stewart Reid
Head of Future Networks
Scottish and Southern Electricity Networks

Introduction

Through our two licensed electricity distribution network areas, Scottish Hydro Electric Power Distribution (SHEPD) and Southern Electric Power Distribution (SEPD), we deliver power to over 8m people in 3.8m homes and businesses across the north of Scotland and central southern England.

The concurrent challenges of decarbonising both transport and heat will require significant and extensive electrification, with the Climate Change Committee (CCC) forecasting that demand on electricity networks could treble by 2050.

SSEN has a statutory obligation to develop, maintain and operate its network in an efficient, co-ordinated and economical manner, to ensure security of supply that delivers value for money for our customers. Since publishing the last version of our Innovation Strategy, the world has changed with the UK adopting a new Net Zero emissions target by 2050. SSEN is fully committed to its role in delivering this target. The needs of our stakeholders have also changed during this period, in part driven by the impact of the COVID-19 pandemic. It is against this context that SSEN has updated its Innovation Strategy, to ensure we are proactive in the development of new solutions to address today's challenges and to ensure our systems are fit for the future as we transition to Distribution System Operation.

The purpose of innovation is to deliver improved outcomes to our customers through smarter networks, whilst facilitating our role in delivering the transition to Net Zero.

This document aims to reflect these changes and set out why we innovate and how we do it. We have clear ambition in this area and seek to build on a proven record of innovation success. We believe innovation is fundamental to the future success of both our business and the broader energy sector.

SHEPD

780,000
homes and businesses connected

49,000 km
overhead lines and underground/subsea cables

SEPD

3.1m
homes and businesses connected

78,000 km
of overhead lines and underground/subsea cables

SSEN is part of SSE, a UK-listed company that operates across the energy sector and its activities and investments contribute £7.7bn to the UK economy every year. We are Fair Tax Mark and Living Wage accredited, showing our commitment to pay the right level of tax at the right time and to ensure fair pay through our supply chain. SSE has set out four Sustainable Goals to achieve by 2030,of which SSEN will play a significant part in delivering.

Our Strategic Objectives

The challenges associated with the move to Net Zero as well as the transition to Distribution System Operation (DSO) emphasise the need for effective innovation. Innovation is pivotal to our ability to deliver our strategic objectives. These objectives remain at the core of this strategy in order to achieve maximum benefit to our customers.

TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK FOR ALL OUR CUSTOMERS

PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES

ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD

MAKE A POSITIVE IMPACT ON SOCIETY

Definition of Innovation

We set out a clear definition of what we mean by innovation:

'Support and enable the efficient delivery of new capabilities to meet consumer needs and deliver value.'

Our innovation portfolio is helping to develop the knowledge and learning to overcome network challenges and facilitate Net Zero. Our wide-ranging approach to innovation includes:

- Engaging with stakeholders to identify new challenges and opportunities across the whole system;
- Identifying opportunities to share best practice and 'fast follow' to deliver benefits for both customers and stakeholders;
- Trialling new tools, techniques, systems and methods of work;
- Developing new knowledge and gathering evidence to shape future plans;
- Identifying and testing the functions to support the transition to DSO and
- Demonstrating new and emerging capabilities to de-risk and learn by doing.

As we continue into our next price control (Electricity Distribution 2 (ED2)), which starts in April 2023 and runs for 5 years, the need to listen to our stakeholders and innovate has never been greater.

Over 55 NIA Projects Registered to date

Two Successful NIC projects

£80m in benefits for customers from our ED1 innovation deployments

120+ collaborative partners

Why do we innovate?

The ability to innovate and derive value from innovation is a key enabler for our business.

We have long recognised the importance of innovation. 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 is critical. We innovate to:

IMPROVE NETWORK RELIABILITY

- Investigating technologies and methods of working to support network security.
- Avoiding and reducing the impact of supply interruptions.
- Improving safety performance for our colleagues.

DELIVER VALUE AND IMPROVE SERVICE FOR CONSUMERS

- Maximising savings by implementing innovative solutions as Business as Usual (BAU).
- Adapting the services we offer to support our stakeholder needs.

FACILITATE NET ZERO TRANSITION

- Improving network access by reducing time and cost to connect low carbon technologies, low carbon generation, and energy storage technologies.
- Supporting the use of flexibility and the transition to DSO.
- Enabling the uptake of electric vehicles and the electrification of heat.

DELIVER MEASURABLE SOCIAL, ENVIRONMENTAL AND SAFETY BENEFITS

- Developing new options for protecting our most vulnerable customers.
- Reducing our carbon emissions and delivering improvements in environmental and safety performance.

We do this in **partnership with our stakeholders:**

- Ensuring stakeholder needs are better understood and met via co-creation of the innovation portfolio.
- Delivering joint projects with groups such as peer utilities, academics, and actively participating in our industry working groups.

And **share our knowledge**

- Developing new knowledge and learning across all industry partners and stakeholders.

Governance

Innovation by its very nature is uncertain and needs to be delivered in an adaptive and responsive manner to meet the challenges of a dynamic and ever changing energy network.

The needs of our stakeholders and consumers will also change, especially as we move towards Net Zero. Regardless of areas of focus, all of our innovation projects follow this process:

- **Innovation Challenges** through the Energy Networks Association or our partnership with Energy Innovation Centre (EIC) (see page 24)
- **Stakeholder Co-creation**
- **Lessons Learned** from projects, internal experience
- **Fast Follow** through learning from other innovation projects

- **Stakeholder Engagement to** understand and confirm the need.
- **Scoping**
- **Understanding benefits** to create value and ensure future savings
- **Planning and budgeting**
- **Assessing Vulnerability Impacts** to ensure a just and fair transition.

- **Senior Management and Business Sponsor Project Approval**
- **Contract Commitment**

- **Stage Gates** to make sure the project is still delivering value, suitable for our stakeholder needs
- **Trial Deployment** Trialling new tools, techniques, systems and methods of work with project partners
- **Lessons Learned -** Capturing and sharing findings

- **Business Case validation**
- **Deployment plan**
- **Benefits Measurement and tracking**

Our Innovation Delivery Principles

Based on our successful ED1 innovation experiences and through feedback from stakeholder consultation - online via webinars and face to face events prior to the 2020/21 pandemic - 92% of our stakeholders agreed with our five delivery principles, underpinned by a strong commitment to "learn by doing".

Collaborative & Open

Working with the supply chain and peers to facilitate the innovative aspirations of stakeholders

Agile

Setting the standard, fast to follow and quick to learn

Relevant

Applicable and connected to what our stakeholders and consumers need

Data Driven

Using data and analytics to anticipate issues, support decision making and ensure our network is ready for Net Zero

Innovation Culture

Evolve our culture to achieve maximum value from our innovation activities

Learn by doing

Collaborative & Open

Collaboration and openness are critical elements of our innovation delivery.

The rapid shift toward Net Zero, combined with the transition to DSO will give rise to a wide range of complex challenges. The resolution of these issues will require an open minded approach to allow input from beyond the traditional boundaries of the electricity network, requiring consideration of the needs and requirements of customers, other network licensees, the Energy Innovation Centre, suppliers, aggregators, flexibility providers, innovators, academics and the wider supply chain.

Through recent consultation, our stakeholders have asked for:

- More transparency – so that SSEN's requirements and needs are more visible and easier to understand.
- Co-creation – to further unlock the value of collaboration and innovation in delivering effective innovative solutions to the complex challenges that the industry faces.
- More effective engagement - to give suppliers the forum to "pitch" new ideas and innovations, as well as helping the supply chain better understand the network challenges.
- Support - to ensure solutions meet our needs and to provide "line of sight" and a route to market for technology and innovation providers.

You said 'Make it easier to engage with decision makers when bringing new ideas in coordination with BAU '

We are creating a new innovation websites to make it easier to access information on our projects and the learnings.

Agile

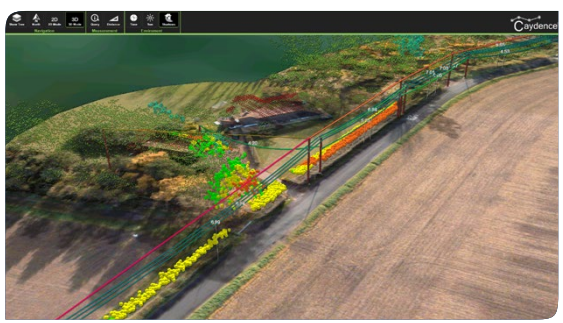
Successful innovation requires agility to be able to learn quickly, respond to change and deliver effective consumer and stakeholder-led solutions.

In practice this means being quick to recognise when an innovation has proven itself and can be deployed into the business to deliver the anticipated benefits. Similarly, it is also about recognising when an innovation is less likely to deliver the anticipated benefits and re-focusing resource appropriately. This can only be delivered with a strong focus on benefits realisation and measurement.

Case Study: **Light Detecting Aerial Radar (LiDAR)**

We invested in state of the art LiDAR technology following an NIA project by National Grid.

The technology offers airborne laser scanning techniques which use aircraft to produce 3D surveys of the network. This allows for analysis of power lines and assets to identify areas at risk of trees or vegetation interfering with the lines. Using this information, tree cutting and maintenance works can be scheduled quicker and on a priority basis.



The aerial laser scanning system is much faster than foot-patrolled line inspections and allows inaccessible areas to be monitored more effectively.

SSEN have now mapped our overhead assets in both our North and South regions, improving our tree cutting and maintenance routines.

Relevant

Building on the principles of Collaborative & Open and Agile, we are committed to ensuring that our innovation portfolio remains relevant and fully connected to what our stakeholders and consumers need.

Crucial to this is ensuring that our innovation portfolio is producing learning in a timely manner. To help ground this principle, we have identified what we believe to be the Areas of Focus for our innovation activities. We have shared these with our stakeholders and they have confirmed that they see these as the key focus areas for our Innovation programme. These areas are pivotal to our ability to deliver SSEN's strategic objectives.

Through recent online events, our stakeholders have told us that their top 5 activities of focus are Net Zero and Low Carbon Technologies, Whole System, Consumer Vulnerability, DSO and Flexibility, and Data.

Innovation areas of focus

- Asset Management
- Operations
- Data and Partnerships
- Connections
- Customer Service
- DSO and Flexibility
- Net Zero and Low Carbon Technologies
- Whole System
- Consumer Vulnerability
- Sustainability

Data Driven

During our engagement, stakeholders specifically asked for better sharing of data, to help better define opportunities and develop smarter analytics to anticipate issues, support decision making and ensure our network is ready for Net Zero

Our Digital Strategy and Action plan set out our ambitions for Digital technology and Data. Digitalisation itself is a significant source of innovation and value. The wider availability of more granular, more timely data offers the opportunity for both SSEN and stakeholders to innovate and develop new services utilising innovative analytical techniques to drive added value from the newly surfaced data. Our stakeholders have highlighted three key points:

Access to data and knowledge of the challenges faced by the network to ensure that new innovations that are brought forward are relevant and timely.

The probability of an economic route to deployment for digital innovation is improved by collaboration and alignment between DNOs.

Many of the benefits of digitalisation are in the field of whole system solutions.

As described in our Digital Strategy, a key part of our plan is the "Data Partnership" and this will seek to deploy a new, innovative and open way of engaging and partnering with third party companies to deliver new capabilities both within SSEN but also for our stakeholders.

Innovation Culture

A strong culture of innovation fundamentally requires three things.

Firstly, the drive to innovate and improve even where that innovation takes an individual or an organisation out of its comfort zone.

Secondly, the time, space and funding for effective innovation. Thirdly, the ability to deploy viable innovation and realise the benefits.

Case Study: **Phase Identification Unit to Assist in Underground Fault Location**

HAYSYS (the Manufacturer) and SSEN have successfully tested handheld phase identification units, which reference the phase at the appropriate secondary substation and then, by approaching the household, the unit can identify if power is present and to which phase the house is connected.

This functionality has been trialled to assess if the unit can reduce fault restoration times. Whilst it is of limited use for faults where the LV fuse is blown, it has aided fault detection when used in conjunction with other technologies. The HAYSYS phase identification unit can be used to identify if the power is on and on what phase without entering the property, which is critical when we cannot get access to the property at night or when people are not at home.

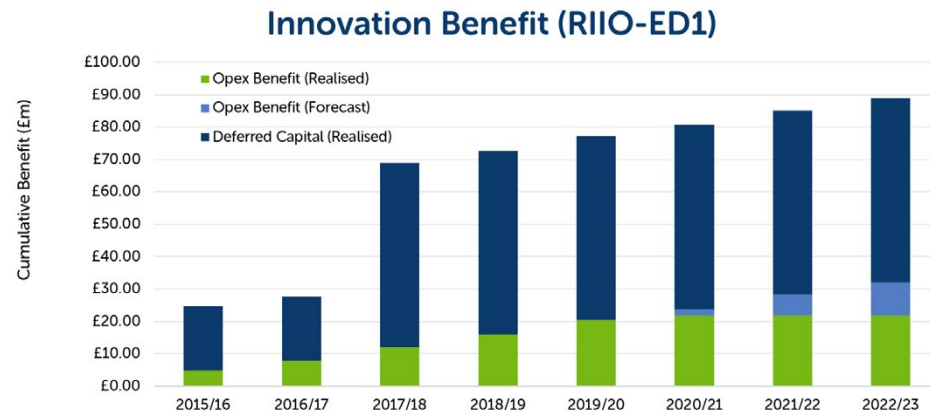
We have successfully secured internal funding to deploy a number of HAYSYS units from which will see efficiencies in the restoration time of faults and reduced disruption from excavations.

Innovation – Our ED1 Performance

SSEN has registered 57 projects through the Network Innovation Allowance and Network Innovation Competition which have delivered **over £80m of benefits** for customers from our ED1 innovation deployments

The graph to the right shows actual and projected benefits which we anticipate rising to £88.9m be the end of the price control period) , in the same period our total NIA spend was £18m. It is important that we continue to invest in innovation to explore new ideas and incorporate these into our business to bring further benefits for our stakeholders.

The next section shares the progress to date for delivering our innovation strategy against the four strategic objectives. A full list of projects can be found at the end of the strategy.



TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK

PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES

ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD

MAKE A POSITIVE IMPACT ON SOCIETY

TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK

We will continue to innovate to deliver value to customers and the business by enhancing network performance and reliability at the lowest possible cost.

Providing a secure and reliable supply is a key priority for our stakeholders. Our innovation portfolio contains a range of projects, which will improve network efficiency and resilience, and bring financial, environmental and safety benefits.

Asset Management

We are developing new approaches to monitor the health of our assets to better understand their condition and, where possible, anticipate failure to allow us to intervene proactively and minimise any disruption to our customers.

These include **SUBSENSE** which uses an acoustic sensing system to monitor the health of our subsea cables. Real time monitoring of submarine cables will give SSEN a greater understanding of the conditions under which our cables operate and help us to proactively manage mechanical wear and tear of these cables, thus mitigating associated lost or interrupted supplies.

We are currently investigating similar approaches to condition assessment of our underground cables with our **SYNAPS** and **Distribution Fault Anticipation** projects, which we are delivering in conjunction with UK Power Networks.

In our **SMART Hammer** project, we are working with a small to medium enterprise (SME) based in the Western Isles to develop a tool which can be used as a consistent and reliable alternative to wood pole inspections. Earlier detection of a deteriorating pole will enable proactive replacement and reduce the incidence of unplanned supply interruptions, improving system reliability.

SUBSENSE
SUBMARINE CABLE SENSING

The Smart Hammer also has the potential to be used by our field staff to more accurately assess the safety risk before climbing a pole.

TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK

Operations

We are developing new approaches to monitor the health of In order to avoid and reduce the impact of supply interruptions, projects like Informed Lightning Protection will help to avoid unplanned outages caused by lightning damage, by better informing us where to locate preventative equipment.

Similarly, our **Low Voltage Underground Fault Location Technologies** (LVUFLT) project will build on earlier deployments of fault location tools, such as the innovative use of Thermal Imaging Cameras (**TOUCAN**) which were incorporated into the business in 2017/18 following a successful NIA project. Thermal Imaging Cameras can detect heat emitted from damaged underground cables, allowing faults to be located more accurately and reducing the number of excavations required. LVUFLT adds acoustic tools to the LV fault location site, which when combined with defined fault location methodologies, allows rapid response operatives to more accurately pinpoint underground faults. This device will look to improve efficiency and LV fault restoration times.

PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES

Co-creation and collaboration are essential elements to innovation, especially as we move to an increasingly decentralised energy system, with many more participants actively engaging in the market.

Asset Management

Going forward, we need to innovate to investigate how to share more data to allow for communities to have more opportunity to manage their energy needs.

Our **MERLIN** project brings together academia and industry to look at how power system economics will impact on future network operation, with a focus on the economic efficiency of flexibility products. To be successful this innovation project will look at the requirement for data sharing to better enable new flexibility markets.

Working with partners ELECTRON, the award winning **TraDER** project is demonstrating how distribution constraint products can be traded in near real time. The output of this project will integrate markets, both horizontally (i.e. with other, longer term DSO products) and vertically (i.e. other trades within the same time period, such as the Balancing Mechanism). TraDER provides a platform creating a single access point, making it easier for distributed energy resources to provide valuable services such as balancing, stability, and network capacity. In this way, "whole system value" is maximised by enabling price-driven coordination between the ESO, DSO and other market participants.

Project **Local Energy Oxfordshire (LEO)** is one of the most ambitious, wide-ranging, innovative, and holistic smart grid trials ever conducted in the UK. In collaboration with several partners, LEO will improve our understanding of how opportunities can be maximised and unlocked from the transition to a smarter, more flexible electricity system and how households, businesses and communities can realise its benefits. **TRANSITION** sits alongside LEO. Its aim is to design, develop, demonstrate and assess the common tools, network data and system architecture required to implement the proposed models from the ENA Open Network project. See here for more information.

PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES

Connections

In delivering benefits to our customers in connections, we have built upon the successful development and deployment of Active Network Management (ANM) from our Northern Isles New Energy Solutions (NINES) project, and the Orkney Energy Storage Park LCNF Tier 1 projects.

The ANM methodology has since been deployed by SSEN within business as usual and has helped SSEN to develop one of the broadest suites of Flexible Connections of any GB DNO.

To date, we have enabled 93 flexible connections to our networks, releasing more than 468MWs of new generation connections and saving customers from a combined 90 years of reinforcement-associated delays. Learnings from this have allowed us to engage more widely with the supply chain to encourage more providers to enter the flexibility market. The learning has also been effectively shared with all other GB DNOs including the establishment of the SSEN-chaired Active Network Management Working Group at the Energy Networks Association (ENA).

Our Assisting Communities to Connect to Electric Sustainable Sources (ACCESS) investigated the option of allowing communities to monitor and manage locally owned generation and storage heating demands within the parameters of an otherwise constrained network. This allowed the community to connect early in advance of an upstream network reinforcement. This framework is now included in our connection offering and is used in multiple locations across our area.

Going forward we will continue to seek opportunities to co-create and collaborate with a broad range of partners to ensure we continue to develop relevant and effective innovation projects.

PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES

Customer Service

Our approach to customer service needs to be agile and innovative to support new risks and services which will be required as the demand for electricity increases.

The **Resilience as a Service** (RaaS) project, developed in conjunction with Costain and E.ON, seeks to develop an innovative solution to improve energy security in rural and remote areas utilising local energy resources. The £9.5m project aims to combine battery storage with local energy resources to provide low carbon, cost effective network resilience in response to faults. By developing a market-based solution which enables batteries and local renewable generation to play an enhanced role in supporting energy system security and facilitates their ability to participate in new markets for flexibility. , RaaS will provide a sustainable solution to improve security of supply for our customers. The project will last four years and applies key learning from E.ON's earlier 'Simris' demonstration project in Sweden, which seamlessly disconnected ('islanded') a section of E.ON's network from the grid and maintained supply during planned network interruptions using a combination of renewables, energy storage and smart energy management.

Our **Network Damage Reporter** project has successfully proven the use of a smartphone application to allow damage to be reported quickly by members of the public to a DNO service centre. Since its launch in July 2018, there have been over 13,600 damage reports submitted with over 100,000 downloads. Since the innovation project, a number of other features, such as 'live' EV charging, have been added to the app to help EV customers locate the nearest live charger in, for example, a storm or fault conditions.

ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD

The distribution network is a key enabler of the Net Zero transition, connecting renewable generation, electric transport, decarbonised heating and energy.

We must ensure that we have the right skills and processes in place, and that we have the forecasts and data available to connect these technologies in the most efficient, co-ordinated and economical way. It is clear innovation has a role to play.

DSO and Flexibility

There is a clear demand from our stakeholders for more flexible connection solutions and improved understanding of the network impacts relating to use of EVs and other Low Carbon Technologies.

Our earlier innovation projects, such as **Orkney Active Network Management (ANM)**, have led to the adoption of new solutions to improve the availability of flexible solutions to connect renewable generation more quickly and at lower cost.

Going forward, we are committed to extending the range of innovative connection options to include demand connections and a wider variety of generation solutions to facilitate the DSO transition.

In addition, we have enabled opportunities for customers to become involved in the provision of flexibility services with our ongoing Flexibility Service Calls. SSEN led the way in announcing the first **Constraint Managed Zones (CMZs)** to support and unlock network flexibility in areas of constraint. SSEN placed its first economically viable CMZ contracts, for a total of 6MW of services on the Isle of Islay. Further zones are being progressed across both our licence areas. These zones make use of technologies providing flexibility to alleviate network constraints, deploying them as an efficient and economic alternative to traditional network reinforcement in the management of peak demand. For further details our flexible connections website here.

LEO and Transition (see slide 16) will bring these flexible connection approaches together to understand how we will facilitate the DSO transition.

Electric Vehicles

EV sales continue to increase, with over half a million ultra low emission vehicles now on UK roads. This brings increased demand and reliance on the electricity network.

As part of the **E Tourism** project, we are exploring potential seasonal and geographical network challenges associated with EV charging points, which may arise from large volumes of EVs being driven by tourists. We have completed a study on the North of Scotland and are now focusing on the Isle of Wight. The Isle of Wight is looking to become a 'green resort' and this project is looking at how the increase in tourist demand and excess solar energy can be managed.

Our **Skyline** project is looking to work with partners across the EV supply chain, including on how data can be used to give early visibility of new EV registrations and charge point connections. This gives an opportunity for DNOs to make timely and proactive network interventions, reducing costs for consumers and facilitating the changes necessary to support the transition to EVs.

You said

'Decarbonisation needs to be top priority....Also supporting community energy and localised energy grids.'

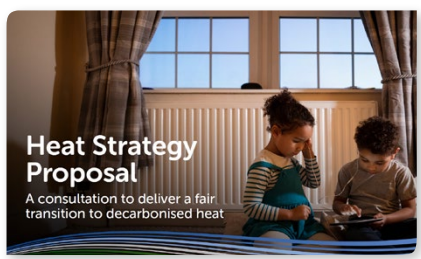
ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD

Heat

With the UK targeting 600,000 heat pump installations annually from 2028, and the Scottish Government aiming for 1 million households to have zero emissions heating systems by 2030, innovation will be required to understand network impacts.

In collaboration with National Grid Electricity System Operator (ESO), our **4D Heat** project explored whether controlled electrified residential heating in Scotland can reduce the curtailment of renewable generation, without adversely impacting the distribution network. Additionally, we commissioned a report from Grid Edge Policy, entitled "**An Electric Heat Pathway**" which examines the opportunities presented by the control, operation and use of domestic electric storage heating as a viable alternative to heat pump technology and as a valuable tool to help achieve the UK's carbon target.

SSEN with Octopus Energy, Ohme and the ESO have teamed up to conduct the UK's largest ever home energy flexibility study. The study, **CrowdFlex**, will analyse 25,000 household energy use patterns to demonstrate how households might change their behaviour and charge electric vehicles, heat pumps and home batteries at different times to access cheaper, greener power.



The analysis will look at how those usage patterns change in response to price signals from Octopus Energy's smart tariffs.

The findings will show how changes in energy price and demand affect consumers and what impact that has on a flexible smart grid powered increasingly by renewables.

Whole System

Whole system thinking is critical to achieving net zero.

It combines electricity, gas, transport and heat network owners with Local and national Government, and community stakeholders to provide a better understanding of infrastructure delivery. To test innovative solutions, opportunities and challenges and understand the impacts of deployment it's imperative we work together to coordinate plans and deliver value for money for our customers.

Our initial **Whole System Growth Scenario Modelling Phase 1** project explored load and energy consumption growth associated with LCT in on and off-grid gas areas. Alongside this, a collaboration, called Green City Vision, with Wales and West Utilities and UK Power Networks investigated a range of energy solutions for heat and transport in Swindon Borough Council.

Both of these projects highlighted the need for a network planning tool that can incorporate the LCT objectives and drivers of local authorities and businesses to ensure co-ordination between networks and local energy plans. This led to a follow up initiative called **Regional Energy System Optimisation Planning (RESOP)**, where we are working with Scotland Gas Network (SGN) and Dundee City Council to develop a tool that will support Dundee's Net Zero ambitions. Dundee City council will be the trial location with an aim to roll out the tool more widely to other local authorities.

MAKE A POSITIVE IMPACT ON SOCIETY

Our stakeholders have expressed concern that as we transition to low carbon technologies, there will be customers, including Priority Services Register customers, who may be 'left behind'.

Consumer vulnerability and ensuring any innovations are accessible to all must feature in our projects.

Consumer Vulnerability

Through our collaboration on the **Smart and Fair Programme**, we continue to work closely with the Centre for Sustainable Energy and WPD to investigate: the unfairness that could occur in a low carbon energy system as the UK transitions to Net Zero; the impacts it could have on vulnerable customers; the risk of negative social impacts; and methods to ensure inclusivity so that no one is left behind. To date, we have the smart and fair data and the methodology available for our Southern licence area which is currently being expanded to Scotland. The methodology exposes the full range of capabilities, characteristics and attributes which are being required of consumers to participate in and benefit from a smarter energy system alongside an analysis of individual and sets of smart energy offers and opportunities to reveal the particular requirements placed on consumers. The methodologies will be used to ensure fairness and accessibility for all future projects.

Through our **Equal EV** project, we are the first DNO to investigate accessibility of EV charging and suitable options which can improve services for current and future EV owners with disabilities. Alongside project partners, Connected Kerb and Disabled Motoring UK, SSEN is working to understand the requirements and the barriers for disabled and vulnerable motorists to make the switch to EVs. This project is also exploring exciting opportunities such as utilising EVs to act as backup power supply to vulnerable households in the event of a power cut.

MAKE A POSITIVE IMPACT ON SOCIETY

Sustainability

Our **Low Energy Automated Networks** (LEAN) project, which is now BAU, has developed and applied Transformer Auto Stop Start (TASS) technology to reduce losses at primary substations. The technology has been successfully controlling automated switching on the SEPD network since June 2018, with energy savings of approximately 70 MWh from two sites over the 12 month trial period. TASS continues to operate as designed, demonstrating its ability to reduce losses and respond to different network situations. The minimisation of technical losses presents a challenge to all network operators. This highlights the importance of working to reduce losses to deliver economic and environmental benefits.

We have successfully trialled and deployed over 10 hybrid generators as alternatives to traditional diesel generation. With lower carbon emissions and less noise pollution, these have real environmental and consumer benefits. We anticipate potential savings of up to 93,000 kg of CO2 emissions per generator over its life time

Through the ENA overhead line working group, we are collaborating with other DNOs in our **APPEAL** project to investigate a less toxic replacement for commercial creosote to maintain our wood poles.

SSEN has committed to setting science-based targets to cut emissions further and faster. Innovation will be key to meeting these targets.

Co-creation and Stakeholder Engagement

Co-creation is at the heart of our approach to innovation and embedded within SSEN's innovation culture. Indeed, the majority of our projects have at least one external partner.

As well as with external innovation bodies, such as Innovate UK, academic partnerships including the Power Networks Demonstration Centre (PNDC), and the Energy Innovation Centre, we are actively seeking to develop new partnerships with other network operators to share best practice and leverage additional value from our BAU-funded investment in specific issues.

The clear intention is to provide an open door to innovators and stakeholders, where we actively look to co-create solutions either as innovation projects or for BAU deployment. At the same time, we will provide open, transparent and timely feedback to innovators whose solutions we decide not to progress.

The adjacent chart shows our collaborations to date with different stakeholder groups.

We frequently engage with our stakeholders via online and face-to-face events such as working groups, webinars and panels as well our newsletters, social media channels and website.

CONSUMERS
- Domestic customers
- Customers in vulnerable situations
- Transient customers
- Next generation bill payers
- SMEs
- Major energy users

CUSTOMERS
- Distributed generation customers
- Builders & developers
- Community energy schemes
- Landowners/ farmers

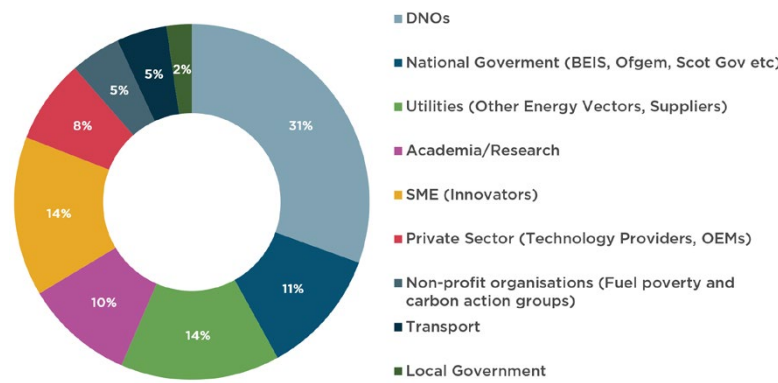
POLICY MAKERS & INFLUENCERS
- Government
- Research bodies, policy forums & think tanks
- Media
- Consumer groups
- Regulators

COMMUNITIES & LOCAL DECISION-MAKERS
- Local authorities
- Charities
- Community interest bodies
- Academic institutions
- Housing associations
- Vulnerable customer representatives
- LEPs
- Emergency response
- Healthcare

WIDER INDUSTRY & VALUE CHAIN
- DNOs
- Transmission
- GDNs
- Water
- Telecoms
- IDNOs
- ICPs
- Energy suppliers
- EV chargepoint operators
- Other supply chain
- Storage & renewable providers/ installers
- Transport & highway agencies

PARTNERS & ENABLERS
- Current & future employees
- Contractors
- Service partners
- Shareholders
- Investors
- Trade unions
- Business advisors

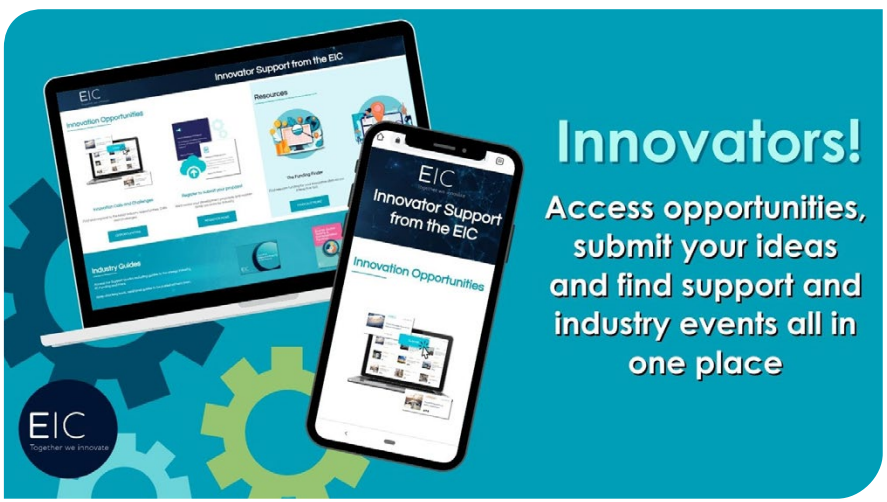
Collaborations



Role of Energy Innovation Centre -
Challenges, efficiency, collaboration and access

EIC

Together we innovate



The EIC is a 'not for profit' organisation in which SSEN was a founding member.

The aims of the EIC are focussed on efficient and effective innovation engagement between the wider innovation community and gas and electricity utility members.

Efficiency is achieved by providing a single route to engage with multiple organisations, through the standardisation processes that emerge from successful co-creation, and through the provision of support for innovators adapting their innovations to provide the best possible business case.

In addition, the EIC provides a platform for collaboration amongst all members - both innovators and utilities - to help identify whole system solutions. A key signature practice of the EIC is the publication of co-ordinated "Challenges" in which industry issues are presented to the innovation community to drive the creation of new solutions. The EIC also provides a "voice" for the innovation community to ensure that their needs are better understood by networks and that the benefits they bring are properly considered. This is now underpinned by new whole electricity system obligations in our Distribution licence.

The EIC have also developed a community of over 7000 and acts as an industry wide conduit for small and medium sized innovators and technology companies. Going forward we will continue to use our partnership with the EIC to engage with the wider innovation community and facilitate collaboration with other member utilities.

Visit the EIC's dedicated innovator support page here.

Support and guidance from the EIC can also be accessed through the EIC's digital hub. Registration and access to 'The Hub' is free of charge thanks to the EIC's partners' support. 'The Hub' allows you to propose potential solutions in response to 'Calls for Innovation', and also to submit details of development proposals or deployment ready products that could help to resolve industry requirements. See all current opportunities here.

Activity review

SSEN has undertaken and is undertaking a series of projects and initiatives that informs our innovation portfolio. This activity review provides a snapshot of our efforts, and the principles with which they align

- TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
- PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES
- ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
- MAKE A POSITIVE IMPACT ON SOCIETY

Project Name	Principles supported
NIA_SSEN_0055 Net Zero Service Termination	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0054 LV Straight Jointing	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0053 Future Control Room	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0052 Low Voltage Feeder Cable Open Circuit Detection	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK; PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES
NIA_SSEN_0051 Synaps 2 - Fault Detection, Classification & Location Solution	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK; PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES
NIA_SSEN_0050 Near Real-time Data Access (NeRDA)	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD; MAKE A POSITIVE IMPACT ON SOCIETY
NIA_SSEN_0049 Equal Electric Vehicles	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD; MAKE A POSITIVE IMPACT ON SOCIETY
SSEEN07 Resilience as a Service	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; MAKE A POSITIVE IMPACT ON SOCIETY
NIA_SSEN_0048 Skyline	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0047 TraDER	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0046 Local Electric Vehicle Energy Loop (LEVEL)	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
UKPNEN03 Optimise Prime	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD

Project Name	Principles supported
NIA_SSEN_0045 Future Fiscal Forecasting	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0044 Smart Hammer	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK; PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES
NIA_SSEN_0043 Whole System Growth Scenario Modelling Phase 2	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0042 Feasibility of Compressed Dry Air 33kV Insulated Switchgear	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0041 MERLIN (Modelling the Economic Reactions Linking Individual Networks)	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK; MAKE A POSITIVE IMPACT ON SOCIETY
NIA_SSEN_0040 Technical Interfaces to Scale as a DSO	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0039 An Electric Heat Pathway – Looking Beyond Heat Pumps	PROVIDE A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES; ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0038 E Tourism	ACCELERATE PROGRESS TOWARDS A NET ZERO WORLD
NIA_SSEN_0037 Low Voltage – Underground Fault Location Technologies (LV-UFLT)	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0036 Social Constrained Managed Zones (CMZs)	MAKE A POSITIVE IMPACT ON SOCIETY
NIA_SSEN_0035 Informed Lightning Protection	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK
NIA_SSEN_0034 Submarine Cable Sensing (SUBsense)	TO DELIVER A SAFE, RESILIENT AND RESPONSIVE NETWORK

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Project Name	Principles supported
NIA_SSEN_0033 ACSS Conductor Study	
NIA_SSEN_0032 Phase Identification Unit to Assist in Underground Fault Location	
SSEEN0 TRANSITION	
NIA_SSEN_0031 Risk Assessment and Modelling of Smart nEtwork Solutions (RAMSES)	
NIA_SSEN_0030 Whole-System Growth Scenario Modelling Phase 1	
NIA_SSEPD_0029 11kV power electronics providing reactive compensation for voltage control	
NIA_SSEPD_0027 Low Cost LV Substation Monitoring	
NIA_SSEPD_0026 Management of plug-in vehicle uptake on distribution networks	
NIA_SSEPD_0025 Applied Integrated Vegetation Management	
NIA_SSEPD_0024 Network Optimisation Project (NOP)	
NIA_SSEPD_0023 Fault Passage Indicators for Sensitive Earth Faults	
NIA_SSEPD_0022 Ester Fluid Transformer Re-Design	

Project Name	Principles supported
NIA_SSEPD_0021 Thermal imaging Observation techniques for Underground CAble Networks (TOUCAN)	
NIA_SSEPD_0020 Overhead Line Vibration Monitoring System	
NIA_SSEPD_0019 Western Isles Network Resilient Zone Utilising Embedded Generation – Feasibility Study	
NIA_SSEPD_0018 Assessment of Remotely Operated Mulching Methods	
NIA_SSEPD_0017 Overhead Line Vibration Monitoring Phase 2	
NIA_SSEPD_0015 LV Connectivity Modelling	
NIA_SSEPD_0014 Underground Cable Overlay Cost Reduction	
NIA_SSEPD_0013 Network Resilient Zone Utilising Standby Generation – Feasibility Study	
NIA_SSEPD_0012 Network Resilient Zone Utilising Embedded Generation – Feasibility Study	
NIA_SSEPD_0011 ACCESS – Local Constraint Management (Mull)	
NIA_SSEPD_0010 Mobile Generation Re-Sync at 11kV and 33kV	
NIA_SSEPD_0009 Automated Loop Restoration	

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Project Name	Principles supported
NIA_SSEPD_0008 Parade (Polemounted Auto-Recloser Automated Distribution Evaluation)	
NIA_SSEPD_0007 Field Team Support Tool	
NIA_SSEPD_0006 Impact of Electrolysers on the Distribution Network	
NIA_SSEPD_0005 33kV Hot Glove Working	
NIA_SSEPD_0004 Ultrapole	
NIA_SSEPD_0003 Network Damage Reporter	
NIA_SSEPD_0002 Locamation SASensor High-Medium Voltage (HMV) Primary Substation Protection	
NIA_SSEPD_0001 DISCERN Knowledge Transfer	
NIA_WPD_0044 Wildlife Protection	
NIA_SPEN_1801 Distributed Ledger Technology	
NIA_UKPN_0037 SYNAPS Fault Detection, Classification & Location Solution	
NIA_WWU_045 Eye in the Sky (DRONES)	

Project Name	Principles supported
NIA_SPEN0008 APPEAL	
NIA2_NGESO001 Crowdflex	
NIA SPEN 0057 Re-Heat Enabling Renewable Heat	
NIA_NGN_142 Project Concur	
NIA_NGSO0033 Heat 4D	
NIA_NPG_001 VONAQ	
NIA_UKPN0029 Assessment & Testing of Alternative Cut-outs	
NIA_UKPN0039 Engineered Pole Products	
NIA_WWU_051 Green City Vision	
WPD_NIA_008 Improved Statistical Ratings for Distribution OHL Phase 2	
NIA_UKPN0047 HV Feeder monitoring to pre-empt faults (DFA)	

Engage with us

The next regulatory price control period, which runs from 2023-2028, will be critical in achieving the UK and Scottish Government's Net Zero ambitions. We're currently developing our draft business plan, which is being informed by extensive collaboration and engagement with our customers and stakeholders. This draft plan will be published in July, after which we'll continue to refine our proposals and undertake further engagement, ahead of submitting our final business plan in December 2021. This will include our innovation strategy going forward.

For any queries or to request further information, please contact us on:

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