



ANNUAL INNOVATION FOCUS REPORT

OCTOBER 2023



Scottish & Southern
Electricity Networks



INTRODUCTION

TOGETHER WE CAN

The next five years and our RIIO-ED2 price control are a critical, and exciting time, for the energy industry. The change that is required to enable a successful Net Zero transition cannot be underestimated, nor can the route to achieving this.

The demand for connections to our network is set to increase significantly by 2035. The reliance on the electricity grid is growing at pace as customers continue to transition to low carbon technology.

Enabling this transition is a complex challenge and one that requires engagement across many areas and a key element of this is innovation.

I'm very proud of what Scottish and Southern Electricity Networks Distribution (SSEN Distribution) has achieved to date by working with partners to innovate and find new and better ways to deliver benefits to over 3.9m customers in the north of Scotland and central southern England.

Sharing the successes we have across our industry is important to continue to drive innovation, learn from others and foster a belief that the complex challenges that are faced in our industry can be overcome through strategic relationships with innovation partners.

This report details some of the significant steps we've taken and progress we've made, helping communities thrive today and create a Net Zero tomorrow. By working hand in hand to collaborate with partners both in and outside of our industry we are embedding innovation into our network, into our tools and into our customer journeys.



Chris Burchell
Managing Director,
SSEN Distribution

Our innovation projects are aligned to our strategic goals, as set out in our RIIO-ED2 business plan, setting us up to deliver a network that will support customers through this critical price control period.

At SSEN Distribution we want to maximise all opportunities for collaboration with like-minded innovators and external stakeholders. It's important we share with you how you can get involved because your input is essential if we are to deliver on our commitments.

I hope this report and the examples of what can be achieved both inspire you and provide confidence in the strength and importance of strategic innovation partnerships. I very much welcome all support and interest to get involved and help our industry accelerate progress to Net Zero through exciting ingenuity and innovation.




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WHAT SSEN DOES TODAY





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 3.9m homes and businesses.

- Our core purpose is to power communities to thrive today and create a Net Zero tomorrow. We have a responsibility to supply customers with safe and reliable power, allowing them to focus on the things that matter most, while we work hard to build a smarter, flexible, greener network that's fit for the future.
- Our vision is to power change with every connection. We need to make each and every connection that we have count and make it better; whether that's the connection we have with our customers and those we work with, our connections with each other and our teams, or connecting innovative low carbon technologies to take us to Net Zero.
- Our purpose and vision will be delivered through four clear priorities: delivering a safe, resilient and responsive network, providing a valued and trusted service for customers and communities, accelerating progress towards a Net Zero world and making a positive impact on society.

A LEADING ROLE IN A LEADING GROUP

SSEN is part of SSE, a UK-listed company that operates across the energy sector and its activities and investments contribute around £9bn 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 business goals to achieve by 2030, aligned to the UN's Sustainable Development Goals (SDGs), designed to drive faster decarbonisation across the next decade.

 <p>Cut carbon intensity by 80%</p>	 <p>Increase renewable energy output fivefold</p>	 <p>Enable low-carbon generation and demand</p>	 <p>Champion a fair and just energy transition</p>
<p>Reduce Scope 1 carbon intensity by 80% by 2030, compared to 2017/18 levels, to 61gCO₂e/kWh.</p>	<p>Build a renewable energy portfolio that generates at least 50TWh of renewable electricity a year by 2030.</p>	<p>Enable at least 20GW of renewable generation and facilitate around 2 million EVs and 1 million heat pumps on SSEN's electricity networks by 2030.</p>	<p>Be a global leader for the just transition to net zero, with a guarantee of fair work and commitment to paying fair tax and sharing economic value.</p>

Source: SSE plc Annual Report 2023

OUR DISTRIBUTION NETWORK AT A GLANCE

Over **3.9million** homes and businesses

More than **888,000** customers on our Priority Services Register

Over **128,000km** of overhead lines and underground cables

Over **460km** of subsea cables powering our island communities

Over **4,100** employees across the country



Figures as at October 2023



ABOUT THIS REPORT

THIS REPORT HAS BEEN DEVELOPED TO

- Demonstrate to stakeholders our progress in delivering our Innovation Strategy.
- Highlight areas where innovation has been embedded into our business and is delivering benefits for customers and SSEN as well as delivering wider societal benefits.
- Highlight emerging opportunities and challenges for the business which are likely to form part of our future innovation portfolio.

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 to help us meet the needs and expectations of our stakeholders, improve the reliability of our network, drive efficiency across our business and improve the services we deliver for our customers.

We do this in partnership with our stakeholders

- Ensuring stakeholders needs are better understood and able to help cocreate our innovation portfolio.
- Jointly delivering projects with other network licensees, academics, original equipment manufacturer (OEMs), local authorities and innovators.
- Sharing our knowledge and learning across industry partners and stakeholders.

OUR RIIO-ED2 STRATEGIC OBJECTIVES



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.



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 Distribution System Operator (DSO).
- Enabling the uptake of electric vehicles and the electrification of heat.



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.



Deliver measurable social, environmental and safety benefits

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



We have explained how we will deliver our strategic objectives in separate strategies each providing extra detail and we have explained how we will deliver our RIIO-ED2 objectives



COCREATING FOR A BETTER OUTCOME

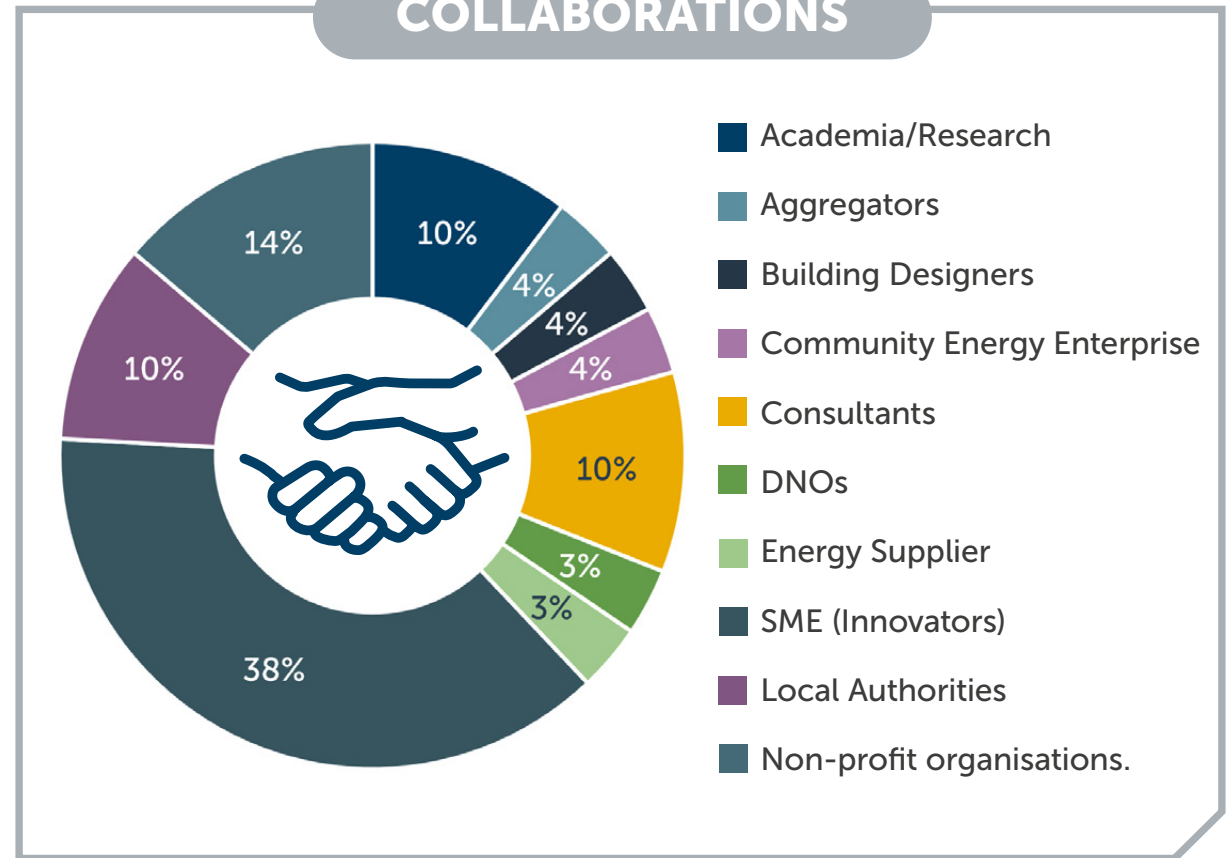
We are proud to innovate with a broad and diverse range of stakeholders. In our current portfolio of innovation projects we collaborate with 29 different stakeholders from 10 separate groups.

Each stakeholder groups brings a depth of knowledge which facilitates an optimised outcome.

SSEN has successfully embedded innovation to create and add value for our customers. This has been achieved thanks to funding from various sources including Network Innovation Allowance (NIA) and Strategic Innovation Fund (SIF). These programmes provide us access to a respected network of experts which help SSEN achieve our Net Zero aspirations. SSEN is committed to investing in our own innovation and growing our diverse team with the best people to deliver our solutions. Our current portfolio of 15 projects has been built around our four Strategic Objectives.



COLLABORATIONS



KEY INNOVATION OUTCOMES AND BENEFITS REALISED DURING RIIO-ED1



Realising benefits for our customers is at the heart of all our innovation.

From trialling smart local energy services, establishing a flexibility market, pioneering fault finding equipment in order to reduce outages, avoid unnecessary excavations and interruptions to service, to creating a data sharing portal which allows local authorities to accelerate their Net Zero targets, our recent innovations have added value by introducing change where it is needed the most. These innovations which are now embedded in our business have reduced costs, improved reliability and enhanced service for our customers.

This all means during RIIO-ED1 which was the price control for Electricity Distribution (2015-2023) we have reduced the number of times our customers lose power, and we are far quicker to get the power back.

LOCAL ENERGY OXFORDSHIRE (LEO)

LEO represented the future of the local energy system.

- LEO trialled smart services and built a flexibility market place. It allowed SSEN to optimise the network through the use of distribution connected energy resources.
- Winner of the Utility Week Collaborative Excellence Award 2022.



FAULT FINDING

LVUFLT / Megger Cable Sniffer / HAYSYS Phase Identification Unit (PIU).

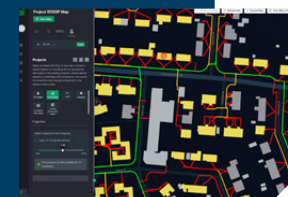
Our technology allows us to find faults quicker. This means we can reduce the time our customers are off supply because we can restore their power sooner.



REGIONAL ENERGY SYSTEM OPTIMISATION PLANNING (RESOP)

This project provides valuable data to Local Authorities to improve their Local Area Energy Plans providing valuable Whole System data.

- Collaborative data sharing project.
- Web GIS tool designed to visualise multiple data sets.
- Enables local councils to support GB Net Zero targets.
- Provides planners with better information.



TOTAL EFFICIENCY FROM INNOVATION DEPLOYMENT

£67m

inc Active Network Management (ANM) & Constraint Managed Zone (CMZ)



AVOIDED REINFORCEMENT COST DUE TO ANM AND CMZs

£46.4m



CARBON EMISSIONS AVOIDED

413,160 tCO₂



CUSTOMER INTERRUPTIONS AVOIDED

512,823



CUSTOMER MINUTES LOST AVOIDED





85,145,028



KEY INNOVATION INVESTMENT AND OUTCOMES


REALISING THE BENEFITS FROM INNOVATION


Throughout RIIO-ED1 and into the start of RIIO-ED2 we have deployed innovative solutions to deliver benefits for our customers and stakeholders, by:


 <p>Improving Network Reliability</p>	<p>We use new techniques to find underground faults faster, and reducing the time our customers are off supply. We want to expand this to find faults before they cause any outage. We have also used drones and LIDAR (Light Detection and Ranging) technology to produce a 3D survey of our overhead network. This gives our teams reliable and up-to-date information to safely operate our network.</p>
 <p>Delivering Value and Improving Services for Customers</p>	<p>Our Power Track app allows customers to report outages or damage to our network via their phone or tablet. It was used more than 1.1m times during the winter of 2022.</p> <p>We used a Constraint Managed Zone (CMZ) to buy flexibility services from local renewable generator on Islay instead of mobile diesel generation. We have adopted this approach to have more flexibility in place to better manage network constraints.</p>
 <p>Facilitating the Net Zero Transition</p>	<p>Projects such as Transition, LEO, and Reheat have demonstrated the impact of LCT (Low Carbon Technology) on our network. RESOP developed new tools to support Local Authorities develop their Local Area Energy Plans. We have set a target of 5 GW for flexibility in RIIO-ED2 which will enable a decarbonised, decentralised, and digitised network. Our total capacity contracted to deliver flexibility RIIO-ED2 is 259 MW (data accurate as of 9th October 2023). SSEN has launched its Global Call procurement round and welcomed more than 46 participants to the information webinar. For the first time, we have used a flexible power dispatch platform to dispatch via API rather than via phone/ email. The tender round started in September 2023 will roll out use of framework agreements in SSEN.</p>
 <p>Delivering Social, Environmental and Safety benefits</p>	<p>We implemented a new approach to Consumer Vulnerability Mapping to develop our Customer Health Index which enhances our PSR. We are building on this during RIIO-ED2 with projects such as VIVID and Vulnerability Future Energy Scenarios (VFES) to help us better support to those who need it most, as we move toward a Net Zero energy system.</p>

FLEXIBILITY DASHBOARD
 TOTAL CAPACITY CONTRACTED TO DELIVER FLEXIBILITY IN RIIO-ED2 SO FAR: **259MW*** 
* data accurate as of 9th October 2023

LAUNCHED GLOBAL CALL PROCUREMENT ROUND 

TENDER ROUND WILL ROLL OUT USE OF FRAMEWORK AGREEMENTS IN SSEN 

FLEXIBLE POWER DISPATCH PLATFORM TO DISPATCH VIA API 

SET TARGET FOR FLEXIBILITY IN RIIO-ED2
5GW 

SSEN's Flexible Solutions have made significant investment in the following areas:

- The creation of the industries first Flexible Solutions team in 2015.
- Member of the Flexible Power Collaboration standardising how Distribution Network Operators (DNO) deliver Flexibility Services.
- The creation of a Centralised Active Network Management (ANM) System.



SSEN has invested in Digital Innovation, three examples of embedded innovation are described below:



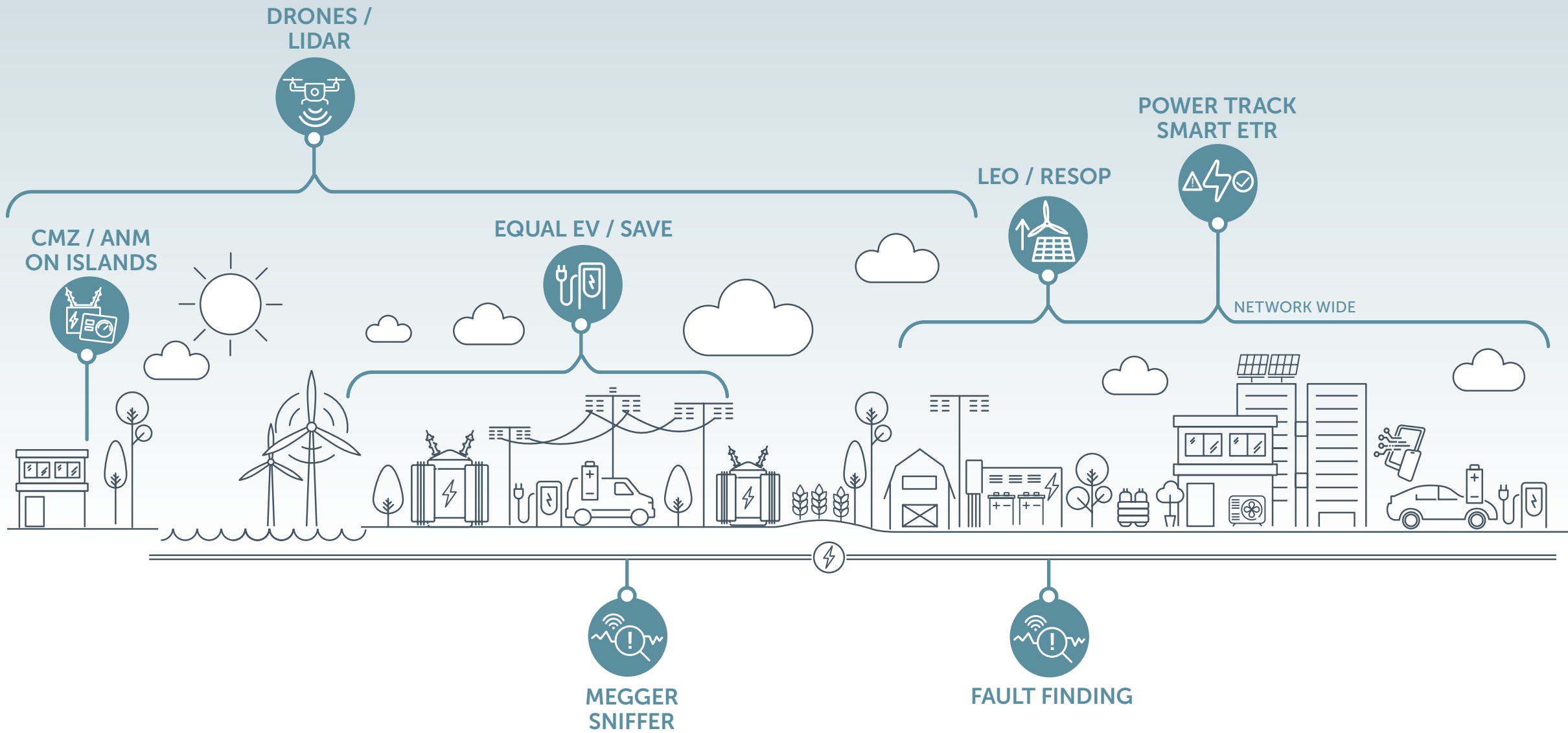
- 1 Smart Estimated Time of Restoration (ETR)**

We use data analytics to give our customers a better estimation of when their power will come back on.
- 2 Fault Forecasting**

We use data analytics to predict when and where faults might occur.
- 3 Load Model**

This allows us to determine the expected demand on our network.







VISUAL SUMMARY OF RECENT INNOVATION PROJECTS



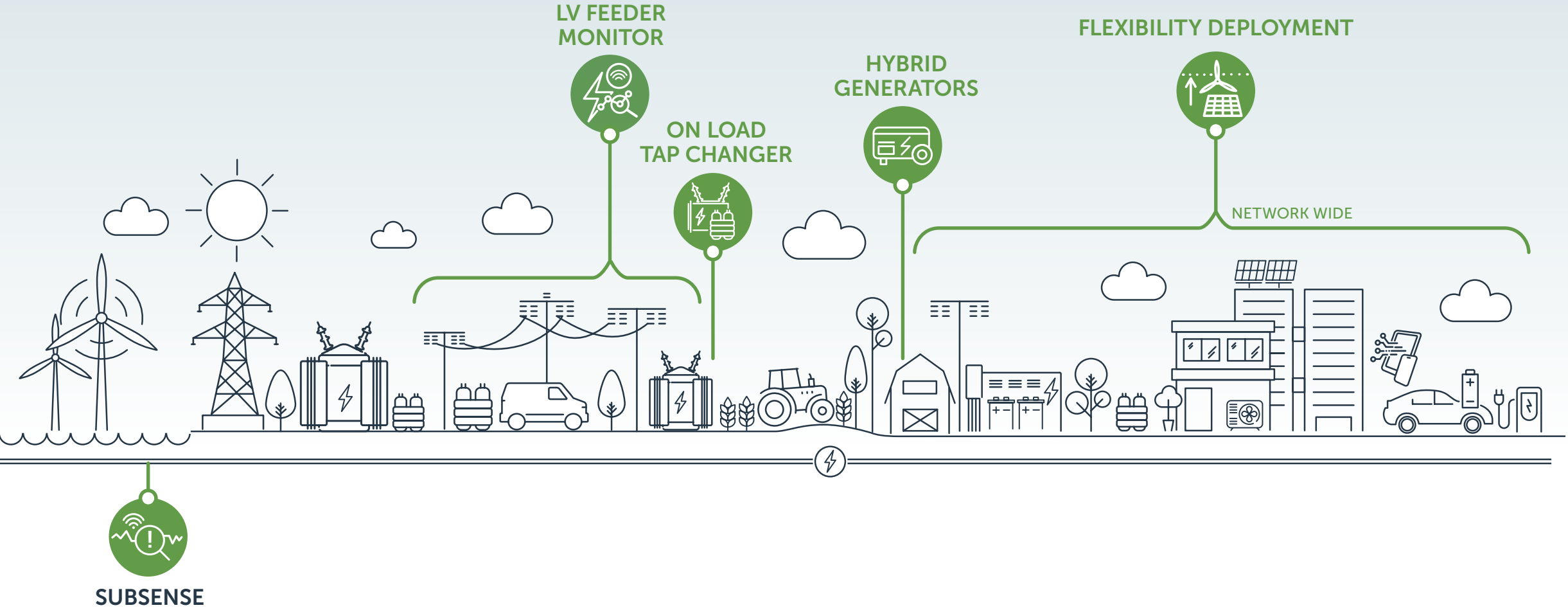
BAU INNOVATION PROJECTS AND ROLL OUT PLAN



We propose to expand and develop our innovation roll out in RIIO-ED2 by bringing through new solutions for deployment that will bring benefits for consumers, improve reliability, reduce carbon emissions, introduce more network flexibility and provide enhanced visibility of network loading to allow us to better facilitate the connection of large volumes of LCTs. These innovation investments will also help support the step change in performance required to deliver the increase in volumes for RIIO-ED2 at the lowest possible cost and allow us to develop the new capabilities required to deliver our outcomes. We propose to invest over £120m across RIIO-ED2, which will produce long term benefits for consumers of over £175m, as well as avoiding over 125,000 tonnes of CO₂.

	Strategic outcome	Innovation	Description	Roll out plan
	Accelerate progress towards a Net Zero World	LV Feeder Monitoring	LV network visibility will be crucial to facilitate the connection of the LCTs required to achieve Net Zero.	We propose to deploy around 19,500 sets of monitors. We have installed approximately 10% so far. With plan to deploy the remainder through to 2028.
	To deliver a safe, resilient and responsive network	On Load Tap Changer for secondary substations	The equipment dynamically manages voltage to the optimum level bringing benefits for the customers connected to the network.	This is the standard stock item for certain sizes of HV secondary ground mounted transformers. SSEN teams are finalising the necessary specifications for tender.
	Make a positive Impact on society	Transformer Auto Stop Start (TASS)	Technology that can automatically switch off a transformer in a Primary Substation at times of low demand to reduce network losses.	The development project is due for completion in FY23/24. Roll-out to sites is expected from FY24/25 until end RIIO-ED2 with even phasing throughout the price control.
	Make a positive Impact on society	Additional Hybrid generators	To replace existing diesel units with lower carbon, more efficient alternatives.	Scoping work is ongoing to identify market options and availability, and suitable suppliers. Delivery of additional sets is expected in the latter years of RIIO-ED2 given supply chain constraints.
	Accelerate progress towards a Net Zero World	Flexibility Deployment	Deployment of flexibility at scale to avoid network reinforcement and other benefits.	Facilitated 95 flexible connections to date. Progress has been made by implementing an organisation change and increasing recruitment.
	To deliver a safe, resilient and responsive network	SUBsense Deployment	This uses an acoustic sensing system to monitor the health of subsea cables.	A decision on the roll out plan for 10 cables expected by Q1 2024.

VISUAL SUMMARY OF BAU INNOVATION PROJECTS





CURRENT PORTFOLIO DESCRIPTIONS

CURRENT INNOVATION PORTFOLIO



The current SSEN innovation portfolio contains a diverse range of projects which supports all aspects of our business.

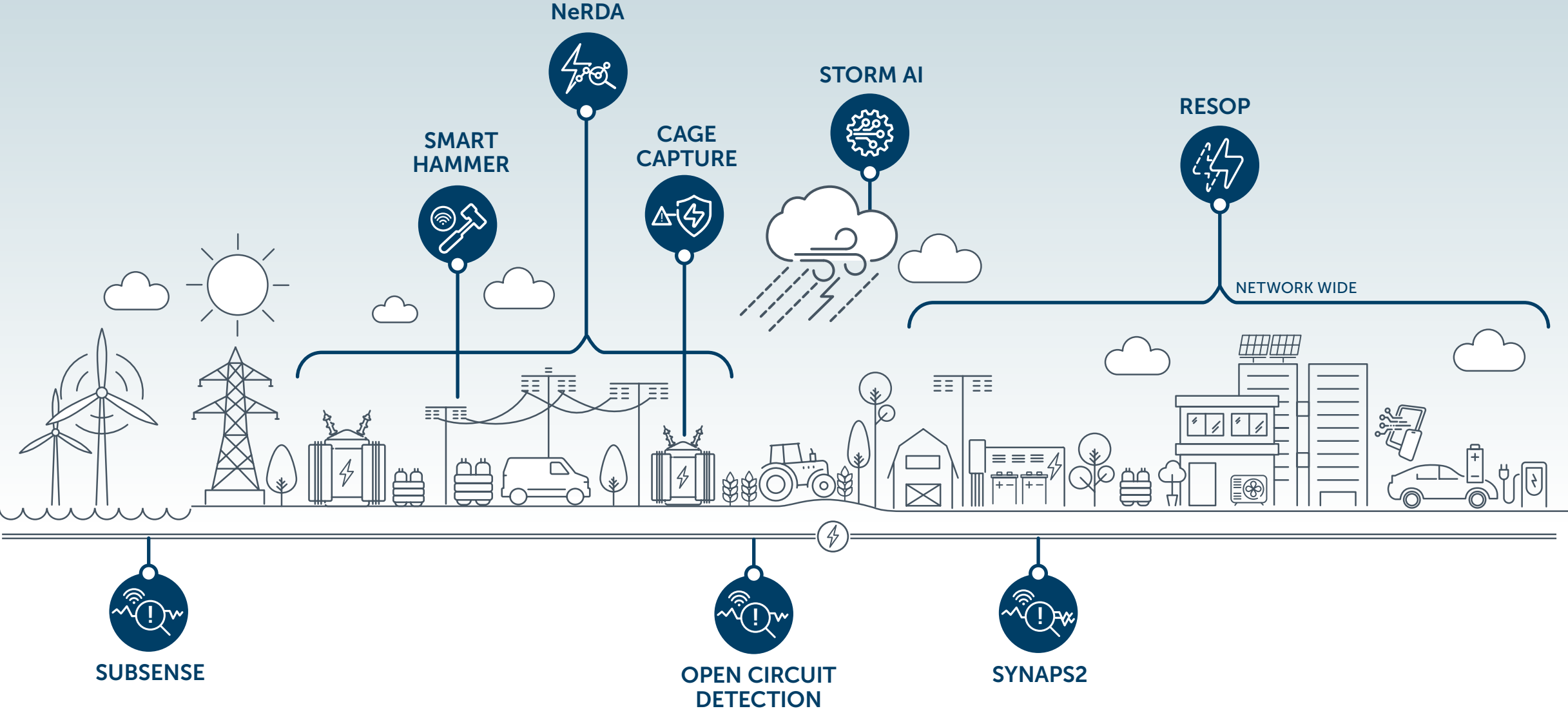
This activity review provides a snapshot of our efforts, and the principles with which they align. Click on the project hyperlinks (which are bold and underlined text) below to get full project details.

Our strategic principles




 DELIVERING A SAFE, RESILIENT AND RESPONSIVE NETWORK	 PROVIDING A VALUED TRUSTED SERVICE FOR CUSTOMERS AND COMMUNITIES
 ACCELERATING PROGRESS TOWARDS A NET ZERO WORLD	 MAKING A POSITIVE IMPACT ON SOCIETY

PROJECT TITLE	PRINCIPLES SUPPORTED
<u>SUBsense</u> : real time monitoring system on new subsea cables.	
<u>Synchronous Analysis and Protection System (SYNAPS 2)</u> : sensors on LV feeders for fault detection, classification, and location.	 
<u>Near Real-time Data Access (NeRDA)</u> : making near real-time network power flow information available.	
<u>Smart Hammer</u> : digital tool for wooden pole inspections.	
<u>Informed Lightning Protection</u> : analysis tool to find the best location for lightning protection equipment.	
<u>Cage Capture SF6 Flange Guard</u> : enabling early capture of SF ₆ leakage from assets.	
<u>Cage Capture SF6 Paint Detection</u> : coating applied to switchgear, pipework, and flanges to detect SF ₆ leaks.	
<u>Open Circuit Detection</u> : locate Open Circuit faults accurately.	
<u>Household Or Microbusiness Energy flexibility (HOMEflex)</u> : develop tools to build trust in the domestic flexibility market and support consumers' engagement.	
<u>Storm AI</u> : understand the role of Artificial Intelligence (AI) and Machine Learning (ML) in providing better information during storms.	
<u>Power Supply for Pole Mounted LV Monitoring Devices where no neutral is present</u> : testing the scalability of this solution.	
<u>Low Voltage Power Quality (LVPQ)</u> : devices to restore power quality and boost network capacity.	 
<u>Regional Energy System Optimisation Planning (RESOP)</u> : A methodology and framework to facilitate efficient whole system planning.	
<u>Vulnerability Identification Via Informative Data (VIVID)</u> : new techniques to identify vulnerable customers who would benefit from offers of support.	   
<u>Local Energy Oxfordshire Neighbourhood (LEO-N)</u> : create an environment for homes, businesses, and communities to transition to Net Zero.	   








VISUAL SUMMARY OF CURRENT INNOVATION PROJECTS



INNOVATION PORTFOLIO REVIEW

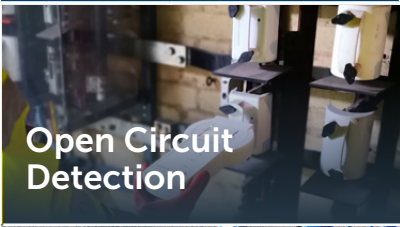



PROJECT	DESCRIPTION	EXPECTED BENEFITS	COST REDUCTION	COST AVOIDANCE	CARBON REDUCTION
 <p>SUBsense</p>	<p>To install real-time monitoring systems on five submarine electricity cables in a variety of different locations interconnecting the Scottish Islands to monitor for third party intervention, cable movement and early fault detection. These cables will be monitored during the project and the data gathered will be assessed by the relevant teams. An evaluation will be completed at the end of the trial with recommendations of the system’s suitability for transfer to BAU.</p>	<ul style="list-style-type: none"> • Install multiple Distributed Acoustic Sensing (DAS) systems onto fibre optic embedded in submarine electricity cables, providing real time monitoring. • Establish an effective communications method to enable real time alerts from remote islands to be received, investigated and actioned from asset management. • Document a baseline condition of the monitored submarine cables. • Monitor for an extended period to assess for alerts from third party intervention, cable movement or cable faults. • Gain an understanding of the system’s suitability as a condition monitoring tool for business as usual adoption and its impact on asset management. • Create a specification for condition monitoring best practices to be used on submarine cables. 	<p>£32M</p>	<p>£9.25M</p>	<p>-</p>
 <p>SYNAPS 2 – Fault Detection, Classification & Location Solution</p>	<p>The SYNAPS Fault Detection, Classification & Location Solution (SYNAPS 1 NIA_UKPN0037) project was successful in trialling a solution which predicted fault locations from electrical waveforms gathered through monitoring equipment prior to any noticeable LV activity, detecting transient or “pecking” fault events of short duration and low energy that did not rupture a fuse or trigger an LV network circuit breaker. Whilst not yet ready for a wider rollout, this technology was certainly of interest and the Synaps 2 project is aimed at increasing the technical readiness level (TRL) to a commercially ready solution.</p>	<p>The project has the potential to develop a commercial underground cable fault-finding device with improved accuracy, along with procedures for operational staff to use the technology.</p>	<p>-</p>	<p>£0.25M</p>	<p>-</p>
 <p>NeRDA</p>	<p>This is a small-scale demonstrator project which makes near real-time data available to stakeholders. This will be tested by engaging with stakeholders including those already involved in ongoing local energy innovation projects.</p>	<p>The project will make near real-time data for the Oxfordshire area available to stakeholders and will assess its usefulness to them.</p> <ul style="list-style-type: none"> • This will be enabled through the implementation of a technology solution for near real-time DNO data within the SEPD licence area to enable its collation and presentation through an Application Protocol Interface (API). • The project assessed the usability of the data through this API with stakeholder groups such as local community energy action initiatives LEO. 	<p>£1M - £3M by 2023</p>	<p>-</p>	<p>-</p>

INNOVATION PORTFOLIO REVIEW

PROJECT	DESCRIPTION	EXPECTED BENEFITS	 COST REDUCTION	 COST AVOIDANCE	 CARBON REDUCTION
 <p>Smart Hammer</p>	<p>To develop a new hammer tool for testing and inspecting the asset health of wood poles. The project will field trial the Smart Hammer on completion of development across the SSEN Operational Regions. Repeatedly striking a pole with the hammer measures the health of the pole and its asset health score is recorded in an accompanying Smart Hammer app.</p>	<p>Benefits of this project will be the establishment of a technically and commercially viable Smart Hammer, with accurate and repeatable results to help detect internal rot or damage to wooden poles. The project aims to identify if the Smart Hammer is a consistent and reliable alternative to the traditional method of wood pole inspections, which use a conventional hammer and the operator's interpretation of the strike. Earlier detection of deteriorating poles will enable proactive replacement, preventing unplanned supply interruptions due to broken poles thus improving system reliability.</p>	<p>£28k p/a</p>	<p>£2.2M</p>	<p>-</p>
 <p>Informed Lightning Protection</p>	<p>Lightning strikes are known to cause a significant number of supply interruptions to our customers. In our Scottish network, lightning strikes are the second highest cause of customer interruptions and minutes lost and in our southern network it is the fifth highest cause. Therefore, there is a need to reduce the impact that lighting related faults have on our customers.</p>	<p>The main benefit of this project is expected to be a reduction in customer supply interruptions caused by lightning-related faults.</p>	<p>£210k p/a</p>	<p>£3M</p>	<p>-</p>
 <p>Cage Capture SF₆ Flange Guard</p>	<p>CageCapture™ 'Capture' solution will improve the speed of response to reduce sulphur hexafluoride (SF₆) emissions by enabling early capture of SF₆ leakage from assets. The project will deliver a leak capture solution that can be applied to switchgear pipework and flanges for the capture of SF₆ leaks. Stage 1 will validate the proof of concept in a suitable test environment; Stage 2 will evaluate application of the product to switchgear on the distribution networks.</p>	<p>The project has the potential to deliver benefits to GB distribution customers based on capture of leaked SF₆ gas.</p>	<p>-</p>	<p>-</p>	<p>855kg SF₆</p>
 <p>Cage Capture SF₆ Paint Detection</p>	<p>CageCapture™ 'Detection' solution will improve the speed of response to reduce sulphur hexafluoride (SF₆) emissions by enabling early detection and location of SF₆ leakage points in assets. The project will deliver a leak detection coating that can be applied to switchgear pipework and flanges for the detection of SF₆ leaks, indicated by exhibiting an ultraviolet fluorescence or colour change. Stage 1 will validate the proof of concept in a suitable test environment; Stage 2 will evaluate the function of the product after application to switchgear on the distribution networks.</p>	<p>The project has the potential to deliver benefits to GB distribution customers based on early detection of leaked SF₆ gas.</p>	<p>-</p>	<p>-</p>	<p>855kg SF₆</p>















Continued on next page


INNOVATION PORTFOLIO REVIEW

PROJECT	DESCRIPTION	EXPECTED BENEFITS	COST REDUCTION	COST AVOIDANCE	CARBON REDUCTION
 <p>Open Circuit Detection</p>	<p>DNOs currently identify open circuit fault locations using equipment from different manufacturers with varying accuracy of results, which sometimes requires an excavation for the equipment to work. This project will investigate different types and ways of sending signals during cable fault location events to investigate which of them is best at pinpointing and locating the position of the cable open circuit fault.</p>	<p>During this project the following benefits could be realised:</p> <ul style="list-style-type: none"> • More accurate location of underground cable open circuit faults on a variety of cables; of various shielding construction, and understanding any limitations of the device; • More efficient planning of remedial repairs; and • Greatly reduced the amount of time customers are without an electricity supply resulting in a reduction in Customer Minutes Lost (CML). 	-	£2.5M	3500 TCO ₂
 <p>HOMEflex</p>	<p>HOMEflex seeks to address gaps in fairness during the development of domestic flexibility services. HOMEflex aims to create an inclusive, fair, and transparent marketplace from the start. It will achieve this by developing a Code of Practice for domestic flexibility services, including a framework and business case for an accompanying Compliance Scheme. If successful, HOMEflex could be used by procurers of flexibility services to give them confidence they are engaging with a trustworthy vendor and used by flexibility providers to demonstrate their credibility. HOMEflex draws on previous findings including Flex Assure for industrial and commercial customers, "Smart and Fair?" and CrowdFlex. This proposal resulted from engagement with Open Networks members and is seen as important for delivering domestic and microbusiness flexibility fairly.</p>	<p>The ultimate benefit of this project will be the development of an inclusive, healthy, publicly trusted and liquid domestic flexibility services marketplace. The project is not dedicated to a specific, single financial benefit to the customer, but rather a better customer experience throughout the whole cycle of a customer's engagement with a flexibility services provider, the avoidance of customer detriment and unrealised income, and facilitation of better understanding of offers and a clear thread of accountability across a potential stack of service delivery partners.</p>	-	✓	-
 <p>Storm AI</p>	<p>The Storm AI project seeks to understand the potential role that Artificial Intelligence (AI) and Machine Learning (ML) could play in providing better information for customers who may have been impacted during a storm.</p>	<p>The main benefits to customers will be in relation to increase accuracy in the Estimated Time of Restoration (ETR). Benefits to DNO will be due to greater efficiency during storms and weather events this is estimated at £2.06m for the next five years based on assumed similar weather patterns.</p>	-	£2M	-
 <p>Power Supply For Pole Mounted LV Monitoring Devices where no neutral is present.</p>	<p>This project is designed to develop learning to understand the specific issues associated with deriving a 230V supply where no neutral is present at pole top monitoring installations. The scale will allow application to several locations which will each have a unique existing physical installation of equipment. The project will demonstrate if a 230V power supply unit is possible in the real-world environment and if it is successful, will report whether the solution is easily scalable.</p>	<p>There are around 50,000 overhead transformers within SSEN, both North and South Regions, and our RIIO-ED2 plans were to monitor around 20% of them, around 10,000 units. Approximately 20% of them supply less than three customers. Experience gained from the linespersons operating in the field indicates that those with less than three customers are most likely to have the neutral on the first pole out, inhibiting the installation of pole mounted transformer LV Monitoring installation. The percentage incidence of vulnerable customers is higher in rural locations with an increased incidence of fuel poverty. Increasing the locations where pole mounted monitoring can be installed will enhance the service that can be offered to our customers.</p>	-	✓	-

✓ Tick Symbol represents what we believe the benefits are expected to be, but it is too early in the project to put actual numbers yet.

INNOVATION PORTFOLIO REVIEW

PROJECT	DESCRIPTION	EXPECTED BENEFITS	COST REDUCTION	COST AVOIDANCE	CARBON REDUCTION
 <p>LVPQ</p>	<p>The Low Voltage Power Quality (LVPQ) project aims to test a range of high technology readiness devices that can restore power quality and boost network capacity. Power quality is impacted by new demands on the network including low carbon technologies. Conventional reinforcement takes time and may not always be the most economic solution. Therefore, alongside flexibility, we need a suite of technology based solutions to address these power quality issues including harmonics, voltage and phase imbalance. Testing will occur at the Power Networks Demonstration Centre (PNDC) with additional testing on the network. The project will also develop the processes for the rapid assessment, selection and installation of the most appropriate solutions.</p>	<p>Update of the ENA database on the PQ impact of LCTs, made available to all DNOs. Novel method of identifying PQ issues through DFES, which can be shared with all DNOs. Identification of optimal solutions to resolve PQ issues, which can be shared with all DNOs. Development of new methods and field assessment techniques for dealing with load related faults on LV networks. Enable benefits of up to £2,604,000 to be realised by the deployment of up to 322 power quality improvement devices over 12 years to defer reinforcement of 1,325 feeders by four years over a 16 year period.</p>		<p>£2.6M over 16 years to cost avoidance for LVPQ</p>	
 <p>RESOP</p>	<p>This project follows on from NIA_SSEN_0030 Whole System Growth Scenario Modelling, which developed an initial model tool demonstrating network impacts and informed possible investment decisions over a two-decade time period.</p>	<p>Enhance a model tool to incorporate new governmental targets for economic and sustainable action plans and provide greater granularity by incorporating the 11kv network. Understand the possible patterns of change associated with the Scottish Government 2045 climate change targets in the distribution networks served by a single Grid Supply Point in an area of accelerated EV growth. Develop optimum solutions to meet whole system needs. Validate and calibrate inputs for whole system planning with existing or planned requirements/expectations for the Local Authorities to avoid unnecessary extra work in producing local energy plans/strategies. Develop a methodology and framework that allows the two-way transfer of knowledge and understanding between network operators and those that make investment decisions in the areas served by the network, to facilitate efficient whole system planning.</p>			
 <p>LEO-N</p>	<p>Project LEO-N addresses the accelerating decarbonisation of major energy demands challenge by developing an innovative approach to creating and enabling environment for homes, small businesses and communities to transition to Net Zero, at pace and scale. At present, there is no clear route to guide consumers, nor is there the supporting infrastructure to support the transition at a local level. Working with the key actors, LEO-N will build on our flagship project LEO by adopting a systems innovation approach, to develop the tools, commercial arrangements and supporting local governance structures to drive the Net Zero transition at pace.</p>	<p>Financial - cost savings per annum on energy bills for consumers. Environmental - carbon reduction - indirect CO₂ savings against a BAU counterfactual. Revenues - creation of new revenue streams. New to market - products. Processes and services.</p>			
 <p>VIVID</p>	<p>VIVID will attempt to unlock the full potential of data held by the energy industry, local authorities and the third sector for the benefit for people and communities in vulnerable situations. We will do this by developing new techniques, using existing data in a safe and secure way to identify which households would most benefit from timely and relevant offers of practical and financial support from their local authority, reputable charities, and responsible energy companies. VIVID will also investigate the creation and maintenance of a common regional vulnerability reference system, initially for Aberdeen City, but applicable to all GB regions.</p>	<p>Financial - future reductions in the cost of operating the network. Financial - cost savings per annum on energy bills for consumers. Environmental - carbon reduction - direct CO₂ savings against a BAU counterfactual. Revenues - creation of new revenue streams. New to market - products, processes and services. Environmental - carbon reduction - indirect CO₂ savings against a BAU counterfactual.</p>			

 Tick Symbol represents what we believe the benefits are expected to be, but it is too early in the project to put actual numbers yet.


INNOVATION OPPORTUNITIES FOR 2023



Every day we see the value our community of innovators is adding to our customers and our network.

We are committed to making it easier for you to work with us. Together we can cocreate the best solutions to our challenges. We will be more transparent about where our priorities are. This level of clarity and openness will guide the innovation community to develop the best solutions and help SSEN accelerate our Net Zero ambitions. The table below shows what we have prioritised for innovative collaborations with our partners and indicates where we would welcome ideas and proposals from the innovation community. Page 20 of this report gives you full details about how to get in touch with your ideas.

NET ZERO / LOW CARBON TECHNOLOGIES (LCTS)	WHOLE SYSTEM	CONSUMER VULNERABILITY	DISTRIBUTION SYSTEM OPERATOR (DSO) AND FLEXIBILITY	DATA	SUSTAINABILITY	CONNECTIONS	CUSTOMER SERVICE	OPERATIONS	ASSET MANAGEMENT
<ul style="list-style-type: none"> Electric Vehicles Heat Distributed Generation Energy Efficiency Storage Forecasting 	<ul style="list-style-type: none"> Transmission / Distribution Other Energy vectors Local Area Energy Plans (LAEPs) Local Heat and Energy Efficiency Strategies (LHEEs) 	<ul style="list-style-type: none"> Priority Services Register (PSR) Support for Communities Economic Development 	<ul style="list-style-type: none"> Scale Up Markets New flexible products and service Neutral Market Facilitator Demo Control Room 2035 	<ul style="list-style-type: none"> New data sources Artificial Intelligence (AI) Machine Learning Analytics Transparency Availability Cyber Security Open Data 	<ul style="list-style-type: none"> Carbon Footprint Losses Sulphur hexafluoride (SF₆) Polychlorinated biphenyls (PCBs) Creosote EV100 	<ul style="list-style-type: none"> Enabling markets Facilitating competition 	<ul style="list-style-type: none"> Information Transparency 	<ul style="list-style-type: none"> Low Voltage (LV) faults High Voltage (HV) faults Protection Monitoring Fault Anticipation 	<ul style="list-style-type: none"> Data analytics Maintenance Asset Life Extension Condition monitoring Reliability Headroom forecasting



STAKEHOLDER ENGAGEMENT

WHAT HAPPENS NEXT?



We welcome any ideas from the innovation community which helps us support our customers, is aligned with our business strategic objectives and helps us achieve our Net Zero ambitions. In a typical year we assess over 400 ideas, of which we do a detailed assessment of around 40 to maintain a portfolio of 10-15 live projects, which can then be embedded into the business.

We will review your idea, get back in touch with you and discuss options for next steps. Our contact details are on the final page of this report. We work in conjunction with the [Energy Innovation Centre \(EIC\)](#) to develop ideas and share challenges with our industry partners to improve the experience for innovators.



SIF NIA **EIC**

BAU **ESNZ Competitions**

SSEN is committed to making it easier to innovate with us. We want to work with the right teams delivering the best solutions at the right time.

Together we can achieve our shared Net Zero ambitions, through earlier and clearer engagement, more transparency and openness, and making better use of all our combined resources.

GLOSSARY



ACRONYM	DEFINITION
3D	Three Dimensional
AI	Artificial Intelligence
ANM	Active Network Management
API	Application Protocol Interface
BAU	Business As Usual
CBA	Cost Benefit Analysis
CML	Customer Minutes Lost
CMZ	Constraint Managed Zone
CO ₂	Carbon Dioxide
CO ₂ e/kWh	Greenhouse gas emission intensity
DAS	Distributed Acoustic Sensing
DNO	Distribution Network Operator
DSO	Distribution System Operator
EIC	Energy Innovation Centre
ESNZ	Department of Energy Security and Zet Zero
ETR	Estimated Time of Restoration
FY	Financial Year
GIS	Geographic Information System
GW	Gigawatt
HV	High Voltage
LAEP	Local Area Energy Plan
LCT	Low Carbon Technology
LEO	Local Energy Oxfordshire
LEO-N	Local Energy Oxfordshire Neighbourhood
LHEES	Local Heat and Energy Efficiency Strategies
LIDAR	Light Detection and Ranging
LV	Low Voltage

ACRONYM	DEFINITION
LVUFLT	Low Voltage Underground Fault Location Technologies
ML	Machine Learning
MW	Megawatt
NIA	Network Innovation Allowance
OEM	Original equipment manufacturer
PCB	Polychlorinated biphenyls
PIU	Phase Identification Unit
PNDC	Power Networks Demonstration Centre
PSR	Priority Services Register
RESOP	Regional Energy System Optimisation Planning
RIIO-ED1	Price control for Electricity Distribution (2015-2023)
RIIO-ED2	Price control for Electricity Distribution (2023-2028)
SDG	Sustainable Development Goal
SEPD	Southern Electric Power Distribution
SF ₆	Sulphur hexafluoride
SHEPD	Scottish Hydro Electric Power Distribution
SIF	Strategic Innovation Fund
SSE	Scottish and Southern Energy
SSEN Distribution	Scottish and Southern Electricity Networks Distribution
SYNAPS	Synchronous Analysis and Protection System
TASS	Transformer Auto Stop Start
TRL	Technology Readiness Level
TWh	Terawatt-hour
UK	United Kingdom
VFES	Vulnerability Future Energy Scenarios
VIVID	Vulnerability Identification Via Informative Data

HOW TO GET IN TOUCH

Together we can achieve our collective goals. We have never before been so committed to expanding our network of experts to work together to accelerate our Net Zero ambitions. We have multiple channels for engagement, and we want you to get in touch. We can't wait to hear from you.



futurenetworks@sse.com



Have a proposal?

Use this link to find the innovation idea form and submit your proposal



twitter.com/ssencommunity



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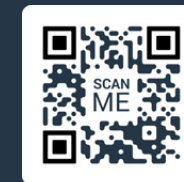


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STAY IN THE LOOP



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Scottish & Southern
Electricity Networks

Powering our
community