Our Innovation Portfolio

Connections & Capacity

Customer Service & Social Obligations

Reliability & Availability

Safety

Environment

Scottish & Southern Electricity Networks
Our Innovation Portfolio

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The move to a low carbon economy will result in changes to the way we live and in our approach to energy. With growing public awareness about the dangers posed by climate change, which is increasingly reflected in public policy, SSEN must be ready for a tipping point when low carbon technologies become the norm and electricity demand is expected to increase dramatically.

Innovation is central to our ability to move towards a more flexible, cost effective and secure electricity network and this document shares some of the ways we are learning by doing. Our experience has show that maximum value is created by combining learning from multiple innovation projects to create an outcome that is greater than the sum of its parts.

For example, the Solent Achieving Value from Efficiency (SAVE) Project demonstrated that simple energy efficiency measures such as installation of LED light bulbs, can reduce peak electricity demand by 5-7%. SAVE also shaped our approach to creating Social Constraint Managed Zones (SCMZs), whereby suppliers of all shapes and sizes, including community groups, delivering anything from battery storage to energy efficiency in customers’ homes, will be given the opportunity to offer flexible services to the network within identified regions in return for commercial rewards.

Another example is Project LEO, a £40m project exploring how the growth in local renewables, electric vehicles (EVs), battery storage, vehicle-to-grid technology and demand side response can be supported by a local, flexible and responsive electricity grid to ensure value for consumers and opportunities for communities and market providers. In turn, LEO is supported by the TRANSITION project, which is trialling the most effective system architecture for network companies to use in future.

Through these and other projects described in this document, SSEN is demonstrating the ability to operate as a Distribution System Operator (DSO). SSEN is an active participant in the Open Networks project, a cross-industry initiative that seeks to support the transition to a smart electricity system that creates and maximises opportunities for customers. We are collaborating with other network operators, including on many of the projects listed above, to ensure our collective experience and learning is efficiently directed.

Data will be fundamental to our transition to DSO and our ability to support a low carbon economy with a smart, flexible electricity system. Better quality data about electricity use and how that use is changing will underpin the future energy market. This information should be provided by smart meters but the rollout has not reached a level of penetration to provide data of sufficient quality. SSEN is installing low voltage substation monitoring to gather data relating to levels of demand and EV uptake, which allow teams from across our business to view electricity demand on a secondary substation. By April 2020 we aim to have 850 low cost monitors installed. Crucially, monitors build our knowledge base and awareness of the potential issues which could arise, giving SSEN the time to deploy appropriate measures to prevent the network becoming a barrier to the transition to a low carbon economy.
Ensuring no one is left behind in the DSO transition is a key priority for SSEN. I am proud that we are supporting the Centre for Sustainable Energy in sponsoring the ‘Smart and Fair?’ research programme. This will consider ways in which unfairness could be created by the transition to DSO, how these can be addressed, and how opportunities can be shared across all our customers.

SSEN and the wider industry has made significant progress on the transition to DSO. In the coming months we will be setting out our learnings and ambitions for the future, in strategies for the DSO transition and for EVs.

We hope that you will find the overview of some of our key projects in this brochure useful. If you require further information or wish to discuss any of the projects, please do not hesitate to contact us or visit our website.

Andrew Roper
Director of Distribution System Operations, Scottish and Southern Electricity Networks
Key activities
This innovation project will issue a number of depot fault location teams with Phase Identification Units. The HAYSYS phase identification unit, is set to reference phase at the appropriate secondary substation and by approaching the household the unit can identify if power is present and to which phase the house is connected. This functionality is the basis of the trial in assessing whether the unit can reduce fault restoration times. It is recognised that for many faults where the LV fuse is blown this unit will not be of assistance but for other faults and in conjunction with other technologies it will be of assistance to the depot fault location teams. The HAYSYS phase identification unit can be used to identify if the power is on and what phase it is on without entering the property which is critical when we cannot get access to the property at night or when people are at work during the day.

Expected outcomes
A number of existing fault location technologies have been developed to substantially improve the re-connection of customers to the network at times of interruption due to faults. However, none at 100% accurate in identifying the preferred location for the primary excavation point.
Overhead Line Monitoring System (CNI Guard)

Key activities
This project develops a previous IFI distribution overhead line monitor; that in-situ can differentiate between natural everyday overhead line movement and unusual/significant disturbances, which if occurs triggers a notification. The concept has been developed with a suitable onward communication medium, which is self-powering, has a low energy signal requirement and can be attached to a wooden pole.

Expected outcomes
This project will be successful if the triggered notifications and the onward communication system are proved to be robust and reliable. In addition the overhead line vibration monitoring system needs to be able to demonstrate that its output can be incorporated into the Control Room to aid visibility of the network.

Fiona Irwin  
Project Manager

Funding
NIA £380k

Start/end date
2013–2019
Key activities

The trials will install and monitor Distributed Acoustic Sensing (DAS) on several of SSEs newly laid distribution submarine cables which have an imbedded fibre optic bundle. DAS will enable real time monitoring and issue alerts if cable movement, third party intervention or partial discharge faults occur. When an alert is issued corrective actions can be planned ranging from mobilising an inspection vessel to carry out repairs or educating other marine users of activity near cables. Alert data can also enhance our understanding of the cable environment and feed back to the planning process for future cables.

Expected outcomes

Real time monitoring of submarine cables will give SSEN a greater understanding of the conditions in which our cables operate. This monitoring will notify us when there is an immediate concern to the health of the submarine cable or safety of nearby marine users. Submarine cables are one of the most costly assets within the Distribution network and currently command the highest Asset Health Points per unit in the Common Network Asset Indices Methodology (CNAIM). Being able to identify a fault location in real time will allow us to carry out repairs quickly and effectively.

Website

https://subsense.co.uk
Whole System Growth Scenario Modelling

Key activities
Understand the possible patterns of change over a two-decade horizon in the distribution networks served by three GSPs in the nominated areas. Create a whole system modelling methodology, and subsequently three specific area models, for anticipating the impact of these changes and the options for responding to them, in various local Future Energy Scenarios. Demonstrate a methodology 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. Apply learning from projects in other regions to assess their value for reducing overall system costs and risks in the three areas, and to identify investment triggers for network improvements.

Expected outcomes
A whole-system methodology is developed which enables a ground-up model to be constructed of a distribution area, looking forward for 20 years or more, under various scenarios, which can inform investment planning and decision-making. The scenario analysis allows the company to examine the scope for applying flexible and distributed energy resources to meet the new DSO responsibilities in the areas modelled. Improved understanding is gained of whole-system factors including the extension of the gas supply network and other utility developments. Acknowledgment from local decision makers of the value of the methodology in allowing them to make the best decisions from a whole system perspective. Dissemination of the outputs to all stakeholders, with continuing engagement.

Rhys Williams
Business Analyst

Funding
NIA £200k

Start/end date
2017–2018
Key activities
Scottish Government plan to phase out petrol and diesel vehicles by 2032, eight years ahead of the rest of the UK. Plug-in Electric vehicles (PEV) are expected to play a key part in the solution and, although there are a range of PEV uptake forecasts, they are all pointing to a significant increase in numbers nationally. In SSE we have a role to ensure that our networks are able to meet growth in demand through the use of local flexibility solutions and investment in network infrastructure. We have made the commitment to do all we can to make sure that no-one is left behind in the transition, and to that end we, working with stakeholders, to anticipate the challenges that will lurk in the detail of the Low Carbon transition.

Expected outcomes
1. Understand how increased EV uptake combined with tourist behaviour will impact seasonal peak demand on the network.
2. Identify the scale, location and duration of any increased charging demand for the North of Scotland followed by an in-depth study of specific locations.
3. Enhance stakeholder engagement for helping local community groups, local authorities and other organisations to understand impacts of heightened EV tourism will have on local demand.
4. Identify suitable local flexible solutions to assist in demand management during seasonal peaks but also benefiting residents all year round where possible. These solutions may extend beyond charge points only to options such as valet charging.
5. Inform investment strategies for network development based on expected impacts of EV uptake and tourist patterns.
Technical Interfaces to Scale as a DSO

Key activities
This project will make sure that DNOs have the ability to scale when implementing DSO services down to the smallest level of customers (e.g. small business and domestic). It aims to investigate, develop and trial cheaper customer interfaces for connecting customers, particularly Distributed Generation, to the network. This project will also make sure that cyber security and internal systems are not put at risk by the new interfaces.

Expected outcomes
This project will deliver a review of connection interfaces and end-point devices from international trials and deployments as well as their cyber security risks and impacts. A functional specification will be drafted that will inform trials in phase 2. Trials in a controlled environment will then identify the most promising interfaces. The learning from this project will lead to a detailed specification document for DSO interfaces.

Matthew Hamilton
Project Manager

Funded
NIA £378k

Start/end date
2019–2021
LV Underground Fault Location Technologies (LV UFLT)

Key activities
This project is seeking ways of improving the LV fault location techniques and increase the available options to resolve them.

Expected outcomes
To have established the technical and commercial viability of the best in class of acoustic cable fault location devices and fault passage indicators working in conjunction with existing proven LV fault location technologies. Maximise the portfolio of technologies available for LV fault location and made recommendations for optimal adoption of the suitable devices for business as usual use. Disseminated the learning from the project through annual or exceptional events for the benefit of GB customers.
Key activities

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.

Expected outcomes

Develop a ‘point in time’ lightning analysis tool that can be used to locate lightning protection equipment in the most optimal way i.e. integrate various data sets and update visual display as described in phase 1a and 1b above. Install lightning protection equipment in ‘optimal’ locations provided by the lightning analysis tool. Monitor and analyse fault data to confirm effectiveness of lightning protection. Update internal policies and procedures if the project is successful. Finally the project will seek to share learnings with wider audience.
**Social Constraint Managed Zones**

**Laura Hawkins**  
Project Manager

**Funded**  
NIA £190k

**Start/end date**  
Mar 2019–Dec 2019

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**Key activities**

SSEN have released 5 CMZ zones to date, all structured around reinforcement deferral where the NPV of postponing reinforcement over a 4-6-year term provides the overall value of the service provision. To date, tender responses received from CMZ type procurement exercises have largely been from large scale I+C customers such as energy storage providers. Whilst, there has been an appetite from smaller community led initiatives to become involved CMZ, this has proven to be challenging.

In addition, SSEN’s current tender assessment process does not currently consider the wider societal benefit of a community providing the Flexibility, generation or efficiency of a CMZ service. Although SSEN has established a clear case for communities and local organisations providing services to a DSO, local groups can need further support to engage with the tender process. In short, the market place at a community level needs assistance and stimulation. The project has progressed with support from National Energy Action, Navigant and Greater South East Energy Hub and is currently in tender stage.

**Expected outcomes**

To reduce the barriers of participation in the CMZ process for smaller community groups by; producing documentation that will aid smaller community groups in understanding the process and requirements of the SCMZ process; providing direct support to interested providers in the Drayton and Coxmoor Wood areas, through seed funding and/or consultant support. The project will also determining the internal processes required for a future rollout of SCMZ to encourage participants in other CMZ areas by working with legal, planning, regulation, CMZ and procurement teams to design processes for the trial which pass approval from all these internal team in order to gain approval for use of these processes for BAU applications.
Power Electronics Providing Reactive Compensation for Voltage Control

Key activities
New power electronic reactive compensation unit are being deployed across a range of locations and to deal with a range of potential voltage problems. Following initial testing at the Power Networks Demonstration Centre (PNDC) in Cumbernauld units were installed on the Isle of Lewis. This installation has provided encouraging results in which electronic reactive compensation has improved the voltage profile seen by our customers both in terms of absolute voltage and the magnitude of apparent voltage changes network performance. Two further installations are being planned in the coming 12 months in order to fully evaluate the performance of these units.

Expected outcomes
The project will confirm that the device is reliable in service, and across a range of weather conditions, and determine the cost of maintenance. For the project to be successful we will be able to determine the ability of the devices to maintain the voltage within statutory limits and to reduce apparent step changes in voltage.

Steve Horsman
Project Manager

Funding
NIA £732k

Start/end date
2016–2020
LEAN (Low Energy Automated Networks)

Sarah Rigby
LEAN Project Manager

Funding
LCNF Tier 2 £3.1m

Start/end date
2015-2019

Key activities
The LEAN project has developed and applied Transformer Auto Stop Start (TASS) technology to reduce losses at primary substations. The key principal of TASS is to switch off one of a number of transformers in a substation at times of low demand to avoid the fixed iron losses associated with that transformer - akin to turning off a car engine when the vehicle isn’t driving anywhere. The TASS system provides local, automated control within the substation to monitor the loading and control this switching, and to respond to alarms and status information from other network assets. In addition, the central network Control Room have remote management capability and visibility of the system.

Expected outcomes
The scheme developed through the project provides a streamlined system for integration with existing assets to deliver the TASS functionality. The technology has been successfully controlling automated switching on the SEPD network since June 2018, with energy savings of ~70 MWh from two sites over the formal 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 network operators, however approximately 6% of electricity generated is lost each year in the GB distribution network, incurring costs in the region of £1bn to customers. This highlights the importance of working to reduce losses to deliver economic and environmental benefits.
TRANSITION

Key activities
TRANSITION will design, develop, demonstrate and assess the common tools, data and system architecture required to implement the proposed models produced by the Open Networks Workstream 3 project. This will include:

- Develop roles and responsibilities for MPs, and market rules to allow MPs to transact services;
- Clarify the requirements and implement a NMF platform for trials;
- Engage and consult with stakeholders;
- Identify up to three network learnings from the above; and
- Provide direct validation and incremental development of the Open Networks market models.

Expected outcomes
The transition to a DSO has the potential to bring significant benefits to customers, it also brings a range of new complex challenges, unintended consequences and risks for market participants, new entrants and the network licensees. TRANSITION is focussed on implementing the outputs from Open Networks. The NMF has the potential to deliver benefits of up to £292m for customers by 2050.

Website
https://www.ssen-transition.com

Brian Wann
Project Manager

Funded
NIA £12.79m NIC

Start/end date
2018–2023
Key activities

The trials will consist of evaluating four energy efficiency measures on participants in the Solent region. The measures use combinations of technology, commercial rewards and engagement campaigns informed by energy consumption and demographic data, and include: light emitting diode (LED) installation, data-informed engagement campaign, DNO price signals direct to customers, and data-informed engagement and Community coaching. The methods have been chosen to allow an assessment of factors such as cost and effort required to implement.

Expected outcomes

Insight into the drivers of energy efficient behaviour for specific types of customers, identification of the most effective channels to engage with different types of customers, a gauge of the effectiveness of different measures in eliciting energy efficient behaviour with customers and to determine the merits of DNOs interacting with customers on energy efficiency measures as opposed to suppliers or other parties. This project established a tool to identify the energy efficiency measures which are most cost effective in terms of managing a particular network constraint.

Website

https://save-project.co.uk
Project Local Energy Oxfordshire (LEO) is one of the most ambitious, wide-ranging, innovative, and holistic smart grid trials ever conducted in the UK. LEO will improve our understanding of how opportunities can be maximised and unlocked from the transition to a smarter, flexible electricity system and how households, businesses and communities can realise its benefits.

UK’s electricity system is changing. The increase in small-scale renewables and low-carbon technologies is creating opportunities for consumers to generate and sell electricity, store electricity using batteries, and even for electric vehicles (EVs) to alleviate demand on the electricity system by charging at periods of low demand. To ensure the benefits of this transition are realised, Distribution Network Operators (DNO) like Scottish and Southern Electricity Networks (SSEN) are becoming Distribution System Operators (DSO).

Project LEO seeks to create the conditions that replicate the electricity system of the future to better understand these relationships, and grow an evidence base that can inform how we manage the transition to a smarter electricity system. It will inform how DSOs function in the future, show how markets can be unlocked and supported, create new investment models for community engagement, and support the development of a skilled community positioned to thrive and benefit from a smarter, responsive and flexible electricity network.

Website
https://project-leo.co.uk/
Partial Discharge Monitoring to Reduce Safety Criticality

Key activities
This project has install two alternative technologies for substation Partial Discharge (PD) monitoring, presently the data is being stored and analysed to explore any linking factors associated with output PD event data. The aim of the substation DP Monitoring is to establish if it can be integrated into the management of safety critical plant. Learning from this project will also be used for further work to incorporate PD failure precursors into control and protection schemes.

Expected outcomes
The project will be considered a success if it can determine the viability of continuous PD monitoring as a tool for the management of safety critical assets on the network.

Fiona Irwin
Project Manager

Funded
NIA £1.3m

Start/end date
2015–2020
Remote Asset INertial Monitoring and Alerting Network (RAINMAN)

Key activities
The Remote Asset INertial Monitoring and Alerting Network (RAINMAN) is the first time remote wooden pole monitoring is being undertaken. The devices are looking for changes in the tilt, roll, pitch, spring, and twist of the wooden poles. It is the communication medium that is novel and makes the remote monitoring possible, for the first time in the UK low power wide area network (LoRaWAN) is being trialled.

Ekkosense, the developer, have integrated the sensing hardware, the analytics software and the LoRaWan with the end information displayed on The Things Network.

Expected outcomes
The project will be considered successful if the installed system can provide timely, reliable and accurate warnings of wooden pole movement or failure, which can then be replicated into a cost effective and economic solution.

Fiona Irwin
Project Manager

Funded
NIA £1.087m

Start/end date
2016–2020
Partial Discharge in HVDC Cables

Key activities

Partial discharge (PD) is the partial breakdown of part of insulation on equipment that is under electrical stress. It is one of the major causes of catastrophic failures in HV equipment. PD mechanisms in HV Alternating Current (AC) systems are well understood and there is a growing body of knowledge around effective detection, monitoring and mitigation techniques under these conditions.

However, there is a lack of knowledge and experience in the industry relating to PD under High Voltage Direct Current (HVDC) conditions. SSEN is investing PD in HVDC cables, a trend replicated by the rest of the GB industry where there is proliferation of interconnectors and connections to offshore renewable sources of energy. To better prepare for the growth in use of HVDC, there is recognition for the need to know more about the mechanisms and characteristics of PD under these conditions.

Expected outcomes

The project developed an open-access database (published in Nature's Scientific Data) of the aforementioned partial discharge characteristics was created and made available as well as an additional journal paper is published on the knowledge generated by obtaining this data. This work forms the basis for a PhD thesis on the topic.

Gerry Cleary
Project Manager

Funding Stream
NIA £50k

Start/end date
2018
Zero Missing Phenomenon

Key activities
This project will investigate the Zero Missing Phenomenon that has arisen due to the increase in reactive power compensation equipment on the network. The investigation will focus on understanding the decaying DC current problem produced through the use of shunt reactors: its likelihood, its cause, potential consequences and risks, and the ability of existing AC circuit breakers to interrupt it. It will also outline any potential mitigation options and test their efficacy through network studies. The planning, training, operation and maintenance requirements of any viable mitigation options will also be explored.

Expected outcomes
The project will provide an improved understanding of the zero missing phenomenon DC current problem due to shunt reactor switching and the problems associated with it. It will also determine the capability of existing circuit breakers to interrupt the prospective DC fault current and produce conclusions that can impact the future of circuit breaker design and the use of shunt reactors on the network. The project will also identify any mitigation options and strategies for the problem and determine how they might be implemented.

Matthew Hamilton
Project Manager

Funding Stream
NIA £128k

Start/end date
2018–2020
Refase Circuit Protection

Key activities
The scope of this project is to conduct a series of tests, including field trials, to benchmark the performance of the Refase system against existing protection methods. Refase allows measured values from up to 50 current transformers to be acquired passively using a single optical fibre core over a distance of up to 50km. These measured values can then be utilised as part of centralised protection and control (PAC) schemes or communicated to traditional PAC devices for analysis via IEC 61850-9-2 / 61869-9, a standard defining communication protocols for intelligent electronic devices (IEDs) in electrical power systems. By centralising current measurements, this method negates the need for multiple protection relays, complex time synchronisation systems at measurement points, and telecommunications equipment among the distributed PAC devices. The measurement system will output sampled value streams locally to protection relays supplied by major vendors which will deploy suitable conventional protection algorithms.

Expected outcomes
The project will provide valuable new learning relating to:
1. Current measurement and real-time comparison on a three-ended circuit, without active telecoms;
2. Measurement distances greater than 30km; and
3. Passive measurement of 9 phase currents from a single merging unit.

Peter Taddei
Project Manager

Funding Stream
NIA £386k

Start/end date
2019–2021
Expanding LoRa

Key activities
LoRa enables long-range data transmissions with low power consumption, which is proving to be an economic and reliable method of communication in rural areas which have limited mobile telephone coverage.

Interest in LoRa has grown, commercial companies are investigating the role out of LoRa networks, which would be suitable to connect monitoring devices from any Utility. There is a need to investigate how to connect off-the-shelf bought IoT monitoring equipment and also how to view / make use of the resulting data.

Expected outcomes
This project will be successful if off-the-shelf IoT can be purchase at an acceptable unit cost, installed, with the resulting real-time field data viewable within a short timeframe.

Fiona Irwin
Project Manager

Funding
NIA £46.5k

Start/end date
Sept 2019–March 2020
Phasor IDP

Key activities
The System Operator Transmission Owner Code (STC) has been amended recently to include, for future requirements, the transfer of elements of Phasor Monitoring Unit (PMU) data directly to the National Grid System Operator. SSEN presently views PMU data on the Secondary Operational Network (2nd OTN) by directly contacting the PMU. SSEN has no facility to actively gather the PMU data, nor is it possible to make elements of PMU information available to a third party. This project will explore the options that are available to manage the flow of PMU information and functionality.

Expected outcomes
This project will be successful if a range of different system architectures that facilitate a range of PMU functionality can be documented.

Fiona Irwin
Project Manager

Funded
NIA £68.2k

Start/end date
2019–2020
**Key activities**

The GB Electrical Transmission Network is expanding with a marked increase in the number of High Voltage Direct Current (HVDC) connections applications. An HVDC connection introduces very large volumes of electrical energy onto the network, which ensures the ‘lights remain on’. The control systems for HVDC connections are very complex, requiring the key transmission network parameters at the point of Transmission system connection. These key parameters, such as:

- electrical system strength;
- local system fault levels; and
- electrical system inertia;

are calculated on computer simulations and incorporated into the HVDC control philosophy.

The present approach to controlling HVDC onto the Transmission System has worked well, however with potentially more HVDC power sources being introduced there is also the need to explore if using real-time system parameters within the control functionality brings additional benefits.

**Expected outcomes**

There are two key objects with this project;

- Explore if electrical system phasor measurements can be used as a means of HVDC control; and if successful;
- Exploring if there are benefits to phasor measurement HVDC Control systems against present methods.
Located in the heart of Scotland, The National HVDC Centre is an ambitious new facility that enables and de-risks High Voltage Direct Current (HVDC) schemes.

HVDC is the most efficient way to transmit electricity over long distances (particularly subsea cables), with reduced losses and increased capacity.

However, it brings a number of challenges, including: potential adverse interactions; the complexity of multi-vendor, multi-terminal and multi-infeed schemes; and the lack of standardisation and interoperability.

The National HVDC Centre addresses these challenges through real-time simulation, training and network diagnosis.

At the Centre, we undertake work commissioned by a range of organisations, including: Transmission owners (TOs), System operator (SO), Offshore Transmission Operators (OFTOs), Interconnectors and Manufactures. Typically focusing on one of the following:

- **Control Interactions**: De-risking control interactions between converters, and with other active controlled equipment, through real-time simulation studies;
- **Multi-Vendor**: Facilitate multi-vendor HVDC schemes, through simulating such schemes with vendor supplied hardware/models;
- **Multi-Terminal**: Facilitate multi-terminal solutions, through developing expertise in their control and operation, and real-time study;
- **Training**: Train and develop engineers in the planning and operation of HVDC schemes as part of the transmission network, using practical experience and simulated scenarios;
- **Operational Diagnosis**: Diagnose and resolve operational issues, and undertake post-commissioning scenario planning and operational optimisation; and
- **Innovation**: Innovate to develop new software/hardware; and support the deployment of new HVDC technologies (through real-time studies).

Website
http://www.HVDCcentre.com
New Suite of Transmission Structures (NeSTS)

Key activities
Scottish Hydro Electric Transmission (SHE Transmission) proposes to develop and deploy a New Suite of Transmission Structures (NeSTS). The NeSTS project will develop innovative designs for overhead lines (OHL) structures based on new technologies and techniques. The new suite of structures will then be deployed on the transmission network.

Expected outcomes
The NeSTS Project seeks to prove the following benefits: improved OHL environmental performance by lowering visual and construction impacts and lower OHL whole life asset costs via reduced land, construction, maintenance and outage requirements.

Website
https://www.NeSTSproject.co.uk

Tim Sammon
Project Manager

Funded
NIA £7.5m

Start/end date
2016–2022
Line Inspection by Semi Autonomous Systems (LISAS)

**Key activities**

Accurate and consistent OHL Conductor and Lower Insulator condition data is difficult to obtain. Present methods of testing and sampling can provide unrepresentative data, require climbing and working at height, this can be very costly (in both operations and outage requirements). This inaccuracy and unrepresentative data becomes more onerous at higher voltages where longer planning periods are required to undertake testing and sampling, further increasing in cost to the consumer.

While drone and flight technology is providing increasing levels of data quality and quantity on towers, poles and fittings; the conductors cannot be monitored with this technology at present. Using robotic devices carrying onboard monitoring equipment which can travel along the OHL without requiring continual human interfacing could allow the conductor to be accurately monitored with substantially more coverage. This principle has been used before, however the robotic systems were not capable of high levels of autonomoy (mainly remote control) and were limited in their ability to work around Tension towers.

The SSEN networks have a high proportion of tension towers which mandates a significantly different approach to the development of robotics and autonomous systems. This project will see a specification for use of Robotic Line inspection systems in the UK capable of working in and around tension towers. Furthermore through the specification modularity will be required, enabling new technologies to be deployed from a common robotic system interfaces. The planned equipping of the robotic devices with cameras would allow further data on lower fittings and insulators while minimizing climbing risks and outage costs.

**Expected outcomes**

The project aims to provide a process and procedure for use of OHL Robotic Devices. This will be achieved through the development of a clear specification for OHL Robotic Condition Monitoring and trailing a robot capable of traversing an OHL with minimal personnel input. The project will be assessed by evaluating known sample data against recorded data from and OHL Condition Monitoring Robot.

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**Funding Stream**

NIA £456k

**Start/end date**

2018–2020