Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Sep 2024

Project Reference Number

NIA_SSEN_0077

Project Registration

Project Title

LCT Connections Readiness Indicator

Project Reference Number

NIA_SSEN_0077

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

October 2024

Project Duration

1 year and 7 months

Nominated Project Contact(s)

Tim Sammon, Innovation Programme Delivery Manager at SSEN

Project Budget

£555,575.00

Summary

The project will look to overcome an initial barrier to Low Carbon Technology (LCT) uptake by producing Connection Readiness Indicators so customers can easily understand how ready a property is to connect an LCT, and give them the ability to request a Distribution Network Operator (DNO) proactively carry out works to upgrade fuses/cut-outs/looped services and remove the potential for delays when they eventually look to install an LCT. This will help customers avoid facing a “distress purchase” scenario where their existing heating system fails and only then are they made aware of the timescales involved in upgrading fuses/cut-outs or removing looped services. The project also aims to demonstrate how having access to data on incumbent heating systems can help DNOs improve network investment activities.

Nominated Contact Email Address(es)

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Problem Being Solved

When customers are looking to decarbonise their heating and/or transport, it is not until they start the applications journey with an installer that they might realise their property’s fuse may not be sufficient, and the associated timescales involved in an upgrade being carried out.

This becomes a source of frustration for customers who are not aware of how “ready” their property is (or is not) for the connection of a Heat Pump (HP) or Electric Vehicle (EV) charger, and find they may have to wait several days for DNOs to confirm the suitability and/or carry out an upgrade to improve the suitability before the Low Carbon Technology (LCT) is connected.

This lack of upfront awareness and subsequent timeframe needed for DNO checks/works is expected to become a major barrier in the

ability for HPs to compete with gas boilers when customers are faced with a “distress purchase” scenario and need a replacement heating/hot water system installed as soon as possible. They are likely to be unwilling to wait several days or weeks for DNO checks/works to be carried out to pave the way for a HP to be installed. Approximately 70% of heating systems are replaced following the failure of the existing heating system, so this is a significant challenge to manage, especially as temporary loss of heating/hot water can make a property uninhabitable, especially for vulnerable customers. In addition, there are other impacts to customers in terms of days off work to hurriedly research possible solutions, get checks done, possible financial burden from finding alternative accommodation or temporary heating/hot water solutions if they were determined to get a HP, and the stress of the overall situation. Combined, this typically results in the outcome being a like-for-like replacement of gas boilers, impacting the transition to net zero.

Furthermore, DNOs are modelling LCT uptake at a granularity of feeder and/or transformer using the outputs of their Distribution Future Energy Scenarios (DFES), yet the granularity and confidence could be improved through the use of additional datasets not currently used in the energy industry (such as those relating to gas boiler servicing). It is a growing concern that homes on estates built around the same time may have boilers likely to fail all around the same time, which could present a major challenge for the Low Voltage (LV) feeder and/or transformer they are connected to should they switch to a HP at the point of replacement.

To give an indication of the scale of the possible challenge, 23 million homes in the UK use a gas boiler as their heating and hot water system, and according to the Heating and Hotwater Industry Council (HHIC) sales of UK domestic boilers for the financial year ending 2020/21 was in excess of 1.75 million units, indicating a national replacement rate of nearly 8% per year.

If customers are stimulated into accelerating their LCT uptake journey through the Smart Building Rating (SBR) being produced by Octopus/Centre for Net Zero, it is highly likely that they will not consider any potential limitation to what LCTs they can have installed. Thus it is important for them to have awareness of any potential works that may be needed to facilitate their LCT uptake.

For Scottish and Southern Electricity Networks - Distribution (SSEN-D), and all DNOs, this overall situation presents a challenge in a) managing customer satisfaction, as inevitably customers will be frustrated should they be forced to wait before any LCT(s) can be installed, and b) planning and managing staff and resources as a result of the requests to confirm connection readiness (fuse size) being purely reactive. By proactively informing customers before they start actively looking to get a LCT, and also improving the awareness of any possible limitations from the start of the customer journey, we can help to boost satisfaction with the overall engagement with DNOs. By improving early engagement between customers and DNOs we can move to proactively confirm/upgrade fuses, resulting in better planning resource management.

Method(s)

In order to overcome the challenges mentioned, we will carry out a desktop study exercise in Part 1 of the project which will develop the logic for the LCT Connections Readiness Indicator (a combination of a logic flow creating a hierarchical/decision tree model that uses known looped services/fuse ratings with assumptions to infer likelihood where data is not present, along with machine learning to improve the outputs) and test using a range of datasets, and create a customer messaging strategy before testing with customer focus groups via a customer experience design company to ensure it is approved by customers and so likely to be effective. We will also investigate the ability to use data relating to gas boilers to try and infer a likely date when it will cease working and so a replacement heating/hot water system will be required, to enable improved customer support and network investment activities.

Then in Part 2 we will carry out a trial to test the efficacy of the innovative approach with real customers, measuring their sentiment towards the LCT Connections Readiness Indicator information, their engagement with SSEN-D, as well as our ability to update the information we hold and carry out proactive asset upgrades.

The innovative aspects are: 1) The creation of a LCT Connections Readiness Indicator and associated customer messaging strategy that will enable a dialogue between customers and DNOs to be established on connection readiness; and 2) using gas boiler data to improve the DFES modelling and associated network investment planning to overcome possible constraints caused by LCT uptake.

Part 1 – desktop research/modelling stage:

• Agree on logic/methodology to establish/estimate current total capacity of each property;
• Agree on logic/methodology to estimate their peak loading and therefore how much capacity will be left (i.e. to connect an LCT);
• Agree on logic/methodology to estimate how suitable the home might be for a HP (i.e. may be so large or have such poor insulation that certain size HP may not be suitable);
• Test logic/methodologies and run on a specific area (area TBC);
• Create the LCT Connections Readiness Indicator database;
• Create customer messaging strategy, including ability to feedback information to enable updates to connections readiness;
• Test customer messaging (inc. ability to feedback where information is incorrect) with focus groups;
• Demonstrate the ability to obtain and use gas boiler age, likely failure rates/age, servicing information and other information to infer a possible end of life date which can be used to create an adjusted DFES scenario, helping model what parts of the network may

become at greater risk of overload from HP uptake (i.e. a more accurate version of a DFES impact assessment), and so better plan customer support/network investment activities.

Part 2 – field trial stage:

• Test concept and customer messaging (inc. ability to feedback where information is incorrect) with customers in urban, suburban and rural areas to cover range of customer and network types;
• Test opportunity for customers to update information via feedback mechanism;
• Demonstrate ability to be receive updated data from customers, validate and then update the database, before re-running the modelling to produce an updated readiness indicator;
• Assess level of customer engagement and receptiveness to concept, and demonstrate any potential impact of customer demographics on this;
• Demonstrate updating of readiness indicators following any load checks/fuse upgrades/unlooping jobs.

Data Quality Statement (DQS): The project will be delivered under the Network Innovation Allowance (NIA) framework in line with the Office of the Gas and Electricity Markets (OFGEM) and 'Energy Networks Association (ENA) and SSEN-D internal policies. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored in our internal systems with appropriate backup and version management. Relevant project documentation and reports will also be made available on the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Measurement Quality Statement (MQS): The methodology used in this project will be subject to SSEN-D's quality assurance regime and the sources of data and data processing will be clearly documented. The measurements, designs and assessments will be clearly documented in the relevant deliverables and final project report made available for review to stakeholders.

Scope

The project will develop logic for creating LCT Connection Readiness Indicator ratings, along with a customer messaging and feedback strategy, and demonstrate how by using data on incumbent heating systems DNOs can better plan customer engagement and network investment activities based on anticipated boiler lifespans.

The outputs of the project will enable customers across GB to benefit from an indication of how ready their property is to connect a LCT, with proactive engagement and DNO works removing potential delays that could impact future decarbonisation efforts (i.e. distress purchase scenario triggering installation of fossil fuel replacement when existing heating system fails).

Complaints relating to delayed domestic EV and HP installations caused by reactive communications regarding connection capacity are estimated to cost £2.7m by 2030 in SSEN network areas. We therefore expect a benefit of approximately 5 times the investment made to deliver the LCT Connection Readiness Indicator solution in SSEN-D network areas by 2030.

Objective(s)

The project will aim to deliver the following objectives:

1. Create logic/methodology for creating LCT Connections Readiness Indicator for properties;
2. Create a customer approved messaging strategy;
3. Develop a customer approved feedback mechanism;
4. Demonstrate how additional data on gas boilers can be used to provide an adjusted DFES to enable improved and proactive customer support and network investment activities;
5. Calculate the impact to UK plc of customers/installers not knowing how ready their property is for connecting a LCT, subsequent delays that may arise when attempting to install a LCT, and the benefits that could be realised from this project's outputs being utilised (avoided hassle with distress purchases, speed of connection, etc.); and
6. Create a clear implementation strategy for the outputs into Business As Usual (BAU) (both internal and external to SSEN-D).

Consumer Vulnerability Impact Assessment

Figure 1

Score:

The project has scored 6.1/10 overall as a result of the potential impacts that may arise out of making information available to customers, knowing if they require any support because of their circumstances and as a result of any site visits that may be required

for any upgrades or checks needed as part of the project and associated processes.

Mitigations

Project increases the need for, time taken, and disruption caused by staff visits to customers' homes:

Mitigation: Whilst customers could use the project to trigger a load check and/or fuse upgrade or looped service removal, these activities would be carried out in future anyway. Bringing them forward removes the stress and disruption when they are triggered at the point of needing an urgent installation (such as when gas boiler fails). A further mitigation is that by providing us with a photograph of their cutout, we will be able to use the image recognition tool developed for the ENA's Connect Direct platform to potentially avoid a site visit for a load check.

Success Criteria

The project will be determined to have been successful if it delivers the following:

1. A methodology for creating a LCT Connections Readiness Indicator for properties;
2. A customer approved messaging strategy;
3. A customer approved feedback mechanism; and
4. Demonstration of how data on gas boilers can be used to improve DFES modelling by predicting when a property may need to replace its current heating system (and potential size of HP needed if customer switches to decarbonised heating).

Project Partners and External Funding

The project will require a mix of expertise and so a number of organisations are required to support delivery.

As the project is looking to dovetail into Octopus Energy and the Centre for Net Zero's project looking at creating a SBR we will leverage their experience and expertise in engaging customers as they may offer us more detailed engagement with their customers in the field trials and knowledge around 'nudge theory' and other behavioural activities.

A key input needed will be regarding the suitability of HPs in relation to property features and network parameters, and so we will be seeking the expertise of the Heat Pump Federation. We will also need to work with insurance and gas boiler service providers in order to obtain data for our improved modelling activities, and so will be actively seeking their input, although possibly not as fully fledged project partners.

In addition, we will require experience and expertise with regards to the life expectancy and common failure rates of various makes and models of gas boilers, and so for this we will be looking to partner with KIWA, an independent and impartial global supplier of Testing, Inspection and Certification (TIC) services who specialise in gas heating technology.

Several other DNOs have expressed an interest in supporting the project as non-funding partners – they are National Grid Electricity Distribution (NGED), SP Energy Networks (SPEN) and UK Power Networks (UKPN).

Finally, the project will require independent expertise in relation to creating and testing the customer engagement, messaging and feedback aspects of the project, and so we will be partnering with ExperienceLab to carry out these key tasks.

Potential for New Learning

The project will aim to provide new learning in the form of:

- The data and logic needed to create a LCT Connections Readiness Indicator for a property;
- The content and delivery mechanism customers prefer for learning of their LCT Connections Readiness Indicator;
- The feedback mechanism customers prefer to correct/update data used by a DNO in creation their LCT Connections Readiness Indicator;
- What gas boiler data can be sourced from insurance and servicing companies to improve HP uptake modelling.

Whilst learning will be disseminated using a range of traditional methods (reports, webinars, meetings), the project will aim for its outputs to be implemented in a range of ways, such as: a layer in the Local Energy Net Zero Accelerator (LENZA) tool to help Local Authorities planning LCT rollout activities; a database incorporated into SSEN-D systems that will support customer connectivity and self-service connections initiatives; a searchable database for third parties to use to inform their own plans/customer engagement activities; and potentially as part of a SBR and/or Energy Performance Certificate (EPC) for properties.

Scale of Project

The project is being split into two sections, Part 1 and Part 2. Part 1 will enable the bulk of the innovation to take place in developing the methodology for the LCT Connections Readiness Indicator and Customer Messaging Strategy and testing on a limited number of customers and properties via desktop research and focus groups. A stage gate will be built into the project following completion of Part 1 to then determine whether to continue with Part 2 – the field trial stage which would see the outputs messaged to real customers unaware of it being a trial, which will enable us to evaluate its impact and perceived benefit by those customers. The project has been scoped to avoid being unnecessarily large in scale, so that we can minimise costs and look to produce outputs with a lean delivery model. If we were to scale the scope/size back, we could jeopardise the potential to generate meaningful outputs that are validated and account for a number of parameters which we expect to encounter when creating the methodology.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be split into two parts, with Part 1 a desktop research stage that will look to evaluate the data available and test the logic to be used to create the outputs, with some customer focus groups and interviews to inform the messaging and feedback strategy. It is anticipated that this will be within the SEPD and SHEPD areas.

Part 2 will be a trial of the approaches agreed in Part 1 and will aim to test on customers in a limited rural area, a limited suburban area and a limited urban area. The project will evaluate the network and customer data of SEPD and SHEPD areas before deciding on the final locations.

Revenue Allowed for the RIIO Settlement

No revenue has been provided in the RIIO-ED2 allowance for this project.

Indicative Total NIA Project Expenditure

Total expenditure is expected to be £555,575.

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

By encouraging customers to understand whether additional checks or work may be required before they look to get a LCT installed, the project will bring forward the load check, fuse upgrade and/or unlooping of services needed for many customers to avoid experiencing delays when looking to install LCT further in the future, which could affect their decision making should they experience a distress purchase when their existing fossil fuel heating system fails, possibly pushing them into getting a like-for-like replacement and not getting a HP – directly challenging the UK's transition to net zero.

How the Project has potential to benefit consumer in vulnerable situations:

Not applicable.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved

Not applicable.

Please provide a calculation and/or description of the expected benefits of the solution

SSEN-D facilitates high volumes of LCT connections each year, and looking at DFES it is anticipated that under the Consumer Transformation scenario there could be nearly 1.5m new domestic EV charger and heat pump installations. For each complaint received by the business we use a £360 cost to serve figure (this covers the costs related to fielding, investigating, remedying and closing of each complaint). If we assume that 0.5% of all domestic LCT installations results in a complaint because of these delays affecting customers' ability to use their new LCT, that translates to a cost to the business of £2.7m by 2030.

Using a project cost of £555,575 to deliver the LCT Connection Readiness Indicator, we can expect a benefit of approximately 5 times the investment made to deliver the solution in SSEN-D network areas.

In addition, we should highlight the expected additional benefits which are harder to quantify but no less important – any delays in replacing a failed heating system can result in customers taking days off work to hurriedly research possible solutions and get checks carried out, possibly face financial burden from finding alternative accommodation or temporary heating/hot water solutions if they were determined to wait for the required works to get a HP, and experience the stress of the overall situation. Ultimately customers may simply opt for another fossil fuel heating system, which delays their and GB's transition to low carbon heating.

Please provide an estimate of how replicable the Method is across GB

The method should be replicable across GB as the data needed for the methodology will be accessible by all DNOs, and the issue facing reactive heating system installation choices and associated challenges is one that will be faced by customer across all licence areas in GB.

Please provide an outline of the costs of rolling out the Method across GB.

The costs to roll out across GB should be low – it is a case of each DNO applying the logic and methodology to their own data and then making the outputs available/messaging customers. However, we will understand any other associated costs once the project is underway.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

Involve Research, Development or Demonstration - Please select all that apply

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☑ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

outputs will enable all other DNOs to replicate the creation of LCT Connections Readiness Indicators for their customers, use the messaging and feedback strategy that has been approved by customers, and also understand how to obtain access to and use data from insurance and servicing companies to better inform their modelling of likely HP uptake at high granularity on their networks.

Not applicable.

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed. Networks must explicitly mention similar projects that they have considered and how these differ.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

There are no other known projects or BAU initiatives which have shown a clear process for establishing a LCT Connections Readiness Indicator for properties, nor the most suitable method of delivering such information to customers and enabling feedback. Also, we have not found organisations using data from insurance and servicing companies on existing heating systems to inform LCT uptake modelling.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project will establish the methodology and logic to create a LCT Connections Readiness Indicator for properties, and a customer messaging and feedback strategy that will enable a dialogue between customers and DNOs to be established on connection readiness – at a minimum one-way (inform customers) but enabling two-way (customer feedback updating the outputs).

At present there is no proactive messaging to customers about the readiness of their property to connect a LCT, and this would be a first for networks as typically all engagement about fuse sizes and looped services is reactive.

In addition, DNOs do not currently use gas boiler data to improve DFES modelling and associated network investment planning to overcome possible constraints caused by HP uptake. Sourcing such information from organisations involved in the insurance and servicing of gas boilers and then using that information to improve asset failure and HP uptake modelling is new for the industry.

Relevant Foreground IPR

The Relevant Foreground Intellectual Property we expect to generate in the project will be the logic and methodology used to create the LCT Connections Readiness Indicator, and we will ensure this is shared with all DNOs in a bid to have it benefit customers across all licence areas.

Data Access Details

For information how to request data gathered in the course of this project, see the Network Innovation Allowance (NIA) Data Sharing Procedure at https://ssen-innovation.co.uk/innovation-strategy/.

Please identify why the Network Licensees will not fund the project as a part of it's business and usual activities

There is a need to research the most suitable method and style of communication with customers in order to indicate their connection readiness, and also test their preferred means of feeding back any information that could help improve any element of the LCT Connections Readiness Indicator. Without knowing this we cannot assign BAU funding to its implementation.

In addition, the sourcing and interpreting of data from insurance and servicing companies requires the experience and expertise of other parties, and we need to know how feasible this is (we will likely need to overcome EU General Data Protection Regulation (GDPR) concerns) and what kind of data quality we can expect.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the project

A significant amount of research and testing will be required to move the concept from an idea to a process that can be implemented by DNOs. The project will require input from a range of organisations to achieve the objectives, and there is a risk that customers will not respond to the type of engagement being proposed unless it is properly vetted by customers through a research stage and then field trial. We need to review the best behavioural nudge approach(es) to have confidence that messaging will be effective. Also, we are unsure as to how possible and effective the sourcing of the data relating to gas boilers will be, and so require innovation funding to help de-risk the efforts involved and encourage organisations to embrace the concept by showing it is attempting to be innovative, and then open up wider engagement with those companies and look to establish a BAU data sharing model.

This project has been approved by a senior member of staff

☑ Yes