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

Jul 2022

Project Reference Number

NIA_SSEN_0063

Project Registration

Project Title

VFES - Vulnerability Future Energy Scenarios

Project Reference Number

NIA_SSEN_0063

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

August 2022

Project Duration

1 year and 8 months

Nominated Project Contact(s)

Tim Sammon

Project Budget

£144,000.00

Summary

The move to net zero will make customers ever more dependent on a secure, affordable, and reliable electrical supply. There is greater potential to impact customers in vulnerable situations as well as to inadvertently create new forms of vulnerability. Current Distribution Future Energy Scenarios (DFES) don't effectively take consumer vulnerability into account. Vulnerability Future Energy Scenarios (VFES) aims to better understand potential changes and impacts. VFES will explore a triangulated method using innovative forecasting techniques which, if successful, could better inform operational practises. It may also allow better informed investment planning which takes vulnerability into account and won't leave vulnerable customers and communities behind.

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

The energy landscape is changing quickly, with an increase in low-carbon distributed generation, electric vehicles, demand side response, low carbon heat, flexibility and energy storage transforming how networks need to serve customers. The GB distribution networks are also broadly aligned with the data used to produce their future energy scenarios.

Across the board, these DNO DFES forecasts are however lacking credible data, research and foresighting on potentially vulnerable customers and communities, and how this will change and evolve as we move to net zero. Without taking factors into account which relate to vulnerability, fuel poverty, medical care at home and other major lifestyle shifts, fairness in the transition to net zero is at risk.

All the DNOs have stated ambitions "not to leave people behind" in the transition to a low carbon future. To do this effectively we must strive to know what makes our customers and communities more or less resilient, where vulnerability and fuel poverty are most prevalent and which factors will drive change in the coming years.

Method(s)

Ensuring a fair, inclusive and safe transition to net zero requires forethought and strategic planning.

Project VFES will bring together academia, data, and expert knowledge, triangulating these three approaches to develop a robust methodology. The project will test for the first time if combining them will give a clearer, and more reliable, forecast of Vulnerability Future Energy Scenarios which can be used to provide insights to allow for appropriate solutions to be developed.

The three methods are:
- Foresighting – Provided by Imperial College London (ICL)
- Machine Learning – Provided by The Smith Institute
- Expert Validation - Provided by policy experts at National Energy Action

Further detail is below in 2.3, Scope.

Scope

VFES statistics, foresight and predictions will be modelled within both SSEN regions. The findings will be shared in a format which can be replicated by other DNOs. As the findings will relate to people, communities, and lifestyle changes, as opposed to network assets and distribution equipment, the methodology and principles for VFES should be replicable for other industries.

In scope will be:

- working with academia to use tried and tested foresighting techniques for assessing potential changes to communities and the lifestyles of consumers which could affect their energy usage patterns and potentially greater reliance on electricity giving rise to new forms of vulnerability
- partnering with data analytics, mathematicians, and machine learning experts to spot trends in consumer vulnerability data and PSR statistics using innovative machine learning technology to better forecast where vulnerability is likely to occur
- reviewing of the findings and suggestions uncovered during the project and validating reportable outcomes
- a report detailing the learnings and opportunities for further insight to enable more robust vulnerability forecasting

Objective(s)

The objectives of the VFES project are to explore how the use of new foresighting techniques, along with data analytics and expert validation can be used to identity and forecast consumers in vulnerable situations as we move toward net zero.

The project will produce a report detailing how far, and how accurately, foresighting and machine learning can predict network requirements based on customer, community, and wider societal factors.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

VFES is a research project in RIIO-ED1, but the whole basis for VFES is to provide better services for vulnerable customers and communities in the future.

Success Criteria

VFES will be a success if the partners produce:
- a combined report detailing how far, and how accurately, foresighting, machine learning, and expert validation/stakeholder engagement can predict network requirements based on customer and community factors

Project Partners and External Funding

The core project partners are:
- ICL
- The Smith Institute
- National Energy Action

Potential for New Learning

This new learning will be disseminated in a report.

Scale of Project

The project builds on an initial first phase of academic foresighting undertaken by SSEN and Imperial College London (ICL). The scale of this project is the minimum viable next step.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The project based with partners all working in England and/or Scotland. Data will relate to SEPD and/or SHEPD regions.

Revenue Allowed for the RIIO Settlement

No funding has been included for the work in the current RIIO Settlement

Indicative Total NIA Project Expenditure

Total expenditure is £144,000 of which 90% (£129,600) is allowable NIA expenditure.

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

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

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

The potential to leave customers behind in the transition to Net Zero is real and we need better visibility of which communities or consumer demographics are likely to be left behind or not accounted for using current methods.

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

VFES is a vulnerability-based project with aims of benefiting consumers in vulnerable situations by predicting the scale and location of such situations as well as what new situations may cause vulnerability.

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 (RIIO-1 projects only)

This is a research project to assess the initial viability of the approach

Please provide a calculation of the expected benefits the Solution

N/A

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

If VFES proves to be a robust way of forecasting the future vulnerability the findings from this project will be presented in a way that will be usable by all GB DNOs. This is an initial assessment and will require further development to ensure that validity of the approach.

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

Not available at this stage – may be included in further follow-on work if this initial project provides a positive outcome.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project 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

RIIO-2 Projects

☐ 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

The learnings from VFES will be disseminated and the project outcomes will be able to be used by all relevant DNOs to better inform their approach to more proactively identifying consumers in vulnerable situations.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

N/A

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.

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

The project builds on earlier work undertaken by ICL and SSEN, it will also utilise the learning from other consumer vulnerability related projects such as WPDs VENICE project. However, the three-pronged approach of foresighting, machine learning and expert validation to produce more robust and longer-term forecasts has yet to be attempted.

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

N/A

Additional Governance And Document Upload

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

This approach of utilising foresighting techniques, machine learning and expert validation to proactively identify consumers in vulnerable situation has never been undertaken by a GB DNO before.

Relevant Foreground IPR

N/A

Data Access Details

Default intellectual Property Rights (IPR) position will be applied

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

This proposal is a trial technique to test innovative methods of forecasting future vulnerability scenarios. If successful, this work could progress to benefit other DNOs or industries who need to predict consumer vulnerabilities in the future.

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

This is a research project which has yet to be proven, therefore requires NIA support to proceed.

This project has been approved by a senior member of staff

☑ Yes