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NIA Project Registration and PEA Document

Date of Submission

Dec 2019

Project Reference Number

NIA_SSEN_0043

Project Registration

Project Title

Whole System Growth Scenario Modelling Phase 2

Project Reference Number

NIA_SSEN_0043

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

January 2020

Project Duration

3 years and 6 months

Nominated Project Contact(s)

SSEN NIA Programme Delivery Manager – – Tim Sammon

Project Budget

£1,300,000.00

Summary

This project follows on from NIA_SSEN_0030 Whole-System Growth Scenario Modelling, which developed an initial model tool which demonstrated network impacts and informed possible investment decisions over a two-decade time period.

Preceding Projects

NIA_SSEN_0030 - Whole-System Growth Scenario Modelling

Third Party Collaborators

baringa

Energy Systems Catapult

Advanced Infrastructure

Derryherk

Dundee City Council

Arup

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

To allow Great Britain to efficiently achieve its low carbon ambitions, a holistic whole system approach is required involving key external stakeholders as well as other energy vectors such as gas. A whole system approach will require significant interaction with local decision makers to understand localised strategies and priorities to achieve decarbonisation and drive economic development. This will give an understanding of the impact of these plans on the current network and the potential need for future investment but should also give stakeholders insight into how the networks can facilitate delivery of their objectives. The need for this local view is leading to both UK and Scottish Governments considering an expanded role for local authorities and increased interest in local energy decision making. The Scottish Government is currently trialing an approach to local-authority led planning for heat decarbonisation and energy efficiency through the Local Heat and Energy Efficiency Strategies (LHEES).

This project follows on from NIA_SSEN_0030 Whole-System Growth Scenario Modelling, which developed an initial model tool which demonstrated network impacts and informed possible investment decisions over a two-decade time period. Since this project finished, there is now a wider awareness of the climate emergency, which has resulted in the national, regional and local government bodies beginning to set strict targets to reduce to net zero greenhouse gas emissions. Many of these targets, rely on electrification of heat and transport with individual local authorities beginning to create their own strategies for low carbon technologies e.g. electric vehicles, heat etc. as well as detailed local energy strategies and Local Area Energy Plans (LAEP) in Scotland.

This project will develop a methodology to improve coordination between local energy planning and network development, enabling the Distribution Networks Operator (DNO) to engage with local authorities in a structured way. As part of that methodology the project will refine the initial model tool developed in the first NIA project to produce a local energy network model which will allow both stakeholder information to be easily incorporated into network planning and for stakeholders to better understand the network implications of their decisions.

The initial model produced by the earlier project needs to be further refined to properly ensure that it reflects the strategic plans being developed by local stakeholders and needs to consider other energy vectors such as gas. The initial model considered three Grid Supply Points (GSPs) in the north of Scotland and it is proposed to develop one of the GSPs to a more granular level; primary substation level. This existing model needs further development to allow for the optimum solution to be identified depending upon local stakeholder priorities and objectives. This will allow for the best whole system solution to be developed and to meet the needs of both the stakeholder and network owner. Additionally, there will be an opportunity to validate earlier assumptions and to assess potential impacts of various scenarios under proposed access and charging regimes being considered as part of the Reform of Access and Forward-looking Significant Code Review (SCR) project an Ofgem led project.

Method(s)

This project will be carried out using a staged approach including research, model refinement, optimisation and dissemination phases. The learnings from each stage will be used to inform the strategic investment required to ensure the continued security and resilience of the network, whilst facilitating whole system planning to meet the needs of stakeholders, as well as producing outputs which will help inform the development of future strategies. This coordinated approach will facilitate the growth and implementation of the low carbon technologies required to achieve the low carbon transition, especially transport and heat.

The project will build on the existing work on Regional Energy Scenarios undertaken by SSEN and includes collaborating and consulting with stakeholders such as Transport for Scotland, Scottish Government, local authorities and council, social landlords etc. All these stakeholders have significant knowledge and experience in their respective areas, which will help to ensure that the model outputs are relevant and reflective of their needs.

The method will follow the stages outlined below:

Stage 1 – Research

Initially, understand what new requirements and expectations will be placed on local authorities in terms of low carbon technology planning and strategies. This will inform and validate what outputs are required to both inform and reflect the economic planning needs of local authority users within the model that will be refined in Stage 2.

This stage will research and collate projected EV uptake, future projects for both transport and heat as well as the local strategies (LHEES) and Local Area Energy Plans (LAEP) to understand changes in demand. This will help to develop a range of future scenarios for a local area.

Engagement sessions will be held with Scotland Gas Networks (SGN) to understand data availability for gas elements within the model and to validate data used in the initial version of the model (produced by the previous project).

This will also include a review of current thinking from ongoing industry initiatives such as Open Networks and previous projects such as Green City Vision to avoid duplication. The project will also ensure it aligns and coordinates with other whole system projects which are underway, albeit with a different geography and focus.

Stage 2 – Model Enhancement

This stage will look to simplify and refine the model produced in the first project to provide more granularity of the impact that low carbon technologies will have on the distribution network. The enhancements to the model will also reflect the new economic and sustainable targets, requirements for local strategies and refined gas network data developed in Stage 1. The project will also utilise the outputs from the Regional Energy Scenarios already published by SSEN as part of DSO preparations.

Where possible, the model enhancements will incorporate access rights and charging options being developed in the SCR process (if available) – this will help users to understand potential ongoing implications of their actions.

Stage 3 – Optimisation

Based on the various scenarios and using the enhanced model developed in Stage 2, the model will look to optimise outputs based on local priorities. This will include identification of key parameters to be tracked to allow calibration of the model outputs. This will include the regional energy scenarios produced by SSEN and Future Energy Scenarios to identify future load growth and low carbon technology uptake.

Using the outputs identified in stage 1, this stage will look to validate the findings and outputs in an environment of accelerated EV uptake etc.

Stage 4 – Stakeholder Engagement and Dissemination

The final stage will deliver training and support to stakeholders to help them with the development of sustainable transport, development and housing policies. This will include how to utilise the tool, assessing its use and updating and maintaining key components. This project would look to inform business as usual outputs for whole system planning to meet the needs of network licensees and local stakeholders as well as recommendations for GB. The learning will be disseminated to local and national stakeholders as well as network licensees.

Scope

The scope of the project is to carry out whole system planning and modelling to a more granular level (11kv distribution network) to understand the impact of low carbon technologies and local authorities' strategies. The project will inform whole system methodology and will capture benefits for GB as a whole, from both a network planning and local stakeholders' perspective.

Objective(s)

1 Enhance a model tool to incorporate new governmental targets for economic and sustainable action plans and provide greater granularity by incorporating the 11kv network.

2 Understand the possible patterns of change associated with the Scottish Government 2045 climate change targets (Note: the UK target is 2050) 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.

3 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.

4 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.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

If the project delivers the anticipated learning to GB stakeholders, then it is deemed successful.

Project Partners and External Funding

The project will involve local and regional government and Scottish Government partners as well as SHE Transmission and Scotland Gas Networks (SGN).

Potential for New Learning

Enhancing the model to include primary substations, will enable increased understanding of how the whole system may change as a response to localised policies and strategies.

This will enable further development of local authority whole system planning approaches to inform their future longer-term investment planning.

Stronger working relationship with Scottish Government and local authority which will improve knowledge on what is important to them and how energy utilities can incorporate their requirements and shape the future infrastructure developments.

The project learnings will be disseminated via a report and dissemination event.

Scale of Project

This medium-scale project will, over 18 months, build upon the model developed under NIA SSEN 003, Whole System Growth Scenario Modelling; to allow a more holistic assessment and strategic prioritisation in achieving localised decarbonisation. Without this approach, the views and assessments of key stakeholder requirements may not be adequately considered. The model will look at a single Scottish GSP.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

Scottish Hydro Electric Power Distribution network area.

Revenue Allowed for the RIIO Settlement

n/a

Indicative Total NIA Project Expenditure

The total expenditure expected from the project is £1,300,000. 90% of which is allowable NIA Expenditure (£1,170,000).

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:

n/a

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

n/a

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)

The outputs from the model will help inform future investment plans for DNOs and other network licensees, however, the primary benefit will be in ensuring that the networks are properly recognised within the development of stakeholders' decarbonisation strategies. The network reinforcement required to achieve decarbonisation will be substantial. This project is aimed at examining the impact of decarbonisation of heat and transport on networks and identifying optimal solutions that reduce the cost of reinforcement. Therefore, the project may result in significant savings for network customers.

Please provide a calculation of the expected benefits the Solution

The calculation is not required for a research project.

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

This is a challenge for all GB DNOs, so this could be replicated across the whole of GB.

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

The cost of rolling out will be determined by the success of the method and as a result the answer to this question will be an output from the project itself.

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 outcomes from the project will be directly relevant to other network licensees as they look to address decarbonisation.

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

Whole system thinking is a key element of the low carbon transition.

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

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 Energy Networks Association portal has been checked to confirm there is no duplication.

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

The project will look to develop new options for optimising whole system solutions and will also inform the development of a framework; used to inform the development of local decarbonisation strategies

Relevant Foreground IPR

n/a

Data Access Details

n/a

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

activities

This is a new method which is yet unproved and needs to be better developed and validated to be introduced as business as usual.

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

There are specific commercial and technical risks in developing the optimisation functionality and the framework that needs support of NIA to ensure that it works for both stakeholders and network owners.

This project has been approved by a senior member of staff

Yes