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

Aug 2022

Project Reference Number

NPG_NIA_042

Project Registration

Project Title

Rural Electrification 2.0

Project Reference Number

NPG_NIA_042

Project Licensee(s)

Northern Powergrid

Project Start

August 2022

Project Duration

1 year and 5 months

Nominated Project Contact(s)

Andrew Webster
(andrew.webster@northernpowergrid.com)

Project Budget

£400,000.00

Summary

Understanding the impact of increasing electrification of the agricultural sector and rural communities / businesses on the distribution network allows the removal of barriers and the acceleration of the net-zero transition.

This will allow Northern Powergrid and their customers to identify and facilitate new opportunities, support decarbonisation of the rural sector and increase rural network reliability..

Third Party Collaborators

EA Technology

University of Leeds

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

The ease of agricultural and rural transition to Net Zero will be influenced by how easily rural businesses can reconcile business, operational and technology constraints. Alongside this, as there is a growing reliance on electricity, vulnerable consumers in rural communities will become increasing dependent on the reliability of their electricity supply.

Opportunities to increase the scope for compromise between these factors, will increase the rate at which agricultural decarbonisation can occur.

The scope for compromise might be increased through

1. Better understanding and deployment of agricultural electricity flexibility

2. Improved network planning assumptions for rural and agricultural daily and seasonal load cycles

3. Novel ways to increase rural reliability

4. Identifying opportunities to engineer reduction in connection or capacity network costs through novel uses of technology features

To support the decarbonisation of rural communities / businesses and the agricultural sector, distribution networks need to first determine what risks and opportunities it will present to the network. These pressures will manifest themselves across a wide geographic area and have varying levels of impact on investment and policy decisions at a network-wide level.

Through an improved understanding of these areas, DNOs could support agricultural transition through effective improvements to business-as-usual practices.

Method(s)

The output of this project will be delivered through 3 distinct phases:

Phase 1 will conduct extensive stakeholder engagement to better understand the technologies and commercial opportunities that could develop in the agricultural sector. This will identify potential operational models for such approach that will impact on the electricity distribution networks.

Phase 2 will take the outputs from phase 1 will carry out analysis to determine the likely impacts and opportunities for the distribution networks. This will be carried out through modelling of a representative part of Northern Powergrid's network and assessing the impact of different operational models on the amount of reinforcement (or other interventions) that would be triggered. Extrapolation of this analysis will estimate the quantum of investment likely over ED2 / ED3 along with potential barriers for the customer, network or regulatory frameworks.

Phase 3 will collate the findings to provide recommendations for policy or procedural changes within Northern Powergrid that may clear or reduce some of the initial barriers. This will also be supplemented with more broader recommendations on recommendations where wider policy or regulatory frameworks may need to be considered to support the acceleration or rural decarbonisation.

Scope

The project is small scale focussed on the decarbonisaton challenges faced by agricultural industry in the Northeast and will involve real world engagement with local stakeholders representing those communities. This will allow the development of computer based network models covering 3 different, representative areas of Northern Powergrid's distribution network.

Objective(s)

The overarching objective of this project is to quantify and understand the impact of electrification of the agricultural sector and rural communities / businesses on the distribution network and identify how this can be managed and accelerated to ensure that any barriers that prevent this sector transitioning towards Net Zero are identified, and where possible, removed.

This objective will be delivered through increased understanding of the technologies or business models that have potential in rural communities, how these will impact the distribution networks and the regulatory or commercial barriers that may prevent their uptake. This will allow Northern Powergrid and their customers to identify and facilitate new opportunities, support decarbonisation of the rural sector and increase rural network reliability.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project is specifically aimed at determining the needs of a potentially vulnerable community - ie rural - likely to become increasingly dependent on the electricty system.

Success Criteria

The project will be judged a success if:

Phase 1 will deliver a report outlining the findings from stakeholder engagement and desktop analysis into a shortlist of technologies / business models and the selection of any that do require network changes to be selected for further analysis.

Phase 2 will deliver a report and results from the delivery of power system analysis models to understand and extrapolate the level of network reinforcement or other initiatives that may be needed over ED2 and ED3 to support decarbonisation of the agricultural sector.

Phase 3 will deliver a report discussing the analysis and findings of phase 1 and 2. This will focus on identifying any barriers to decarbonisation that exist and provide recommendations for policy or procedural changes where relevant. This aiming to reduce barriers and create new opportunities for Northern Powergrid and their customers.

Project Partners and External Funding

None.

Potential for New Learning

Customer numbers in rural networks are relatively low and therefore an area with limited analysis previously undertaken. Typically customers in rural-communities have been self-reliant but as the uptake of LCTs continues this reliance is going to increase. As a result, analysis into rural areas opens up high potential for new learning. The project objectives are directly related to the development of that learning.

The project will enable distribution networks to develop a robust insight into how rural and agricultural decarbonisation will impact network operations and how a faster decarbonisation can be supported. This will identify changes to policies, procedures and regulation that ensure a lower overall society cost.

The challenges of decarbonisation across agriculture are expected to be experienced by distribution networks throughout the country and this innovation project will demonstrate the potential for a standardised approach that can be adopted elsewhere.

Scale of Project

Small scale study. Desktop.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

NE England.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£400k

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 project is focussed on understanding how rural communities can more easily participate in the net-zero transition.

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

Rural areas are potentially amongst the poorest and most vulnerable. not a great dela of work has been done to understand the specific needs of these communities with respect to future energy need and use.

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)

To accommodate the rural transition to Net Zero a detailed understanding of the future agricultural business needs is understood. One component of this is the availability of agricultural flexibility services to minimize network investment. As it stands, the specific operating models and potential for these flexibility services is unknown. Understanding these future business models is essential to deliver the Flexibility Market Intelligence required for the NPg Flexibility First model. This will ensure agricultural flexibility services can not only deliver more reliable rural networks, creating additional value from the £4.3m investment for some of NPg's worst-served customers but it will also ensure viable services exist to deliver a proportion of the £156m flexibility and smart grid savings anticipated during RIIO-ED2

Please provide a calculation of the expected benefits the Solution

N/A

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

The solution is replicable across the GB network as a whole. Approximately one sixth of the population lives in a rural area.

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

Costs are marginal for rolling out the project output.

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

All project outputs, including models, will be made available to other licencees. this will aloow their use of the proejctt output to be tailored to their particular network configurations in rural areas.

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

The work to be undertaken supports the strategic objective of supporting the net-zero transition for our customers. It also supports the need to understand the requirements of more vulnerable customer groups.

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.

There appears to have been no previous studies of net-zero electricity need and its impact on rural communities.

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 understanding of the impact of technology to enable the low carbon transition is only now becoming a key straegic planning issue of understanding as we look forward to late ED2/ED3 transformational needs.

Relevant Foreground IPR

Reports and models.

Data Access Details

No large scale datasets will be generated by this work.

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

The project outcome is uncertain, being of low TRL, of long-term impact and any economic outcome will not be seen until after the ED3 price control.

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 is no commercial benefit to the project that will not be ceded to the customer through improvements in long-term network development and future cost reduction.

This project has been approved by a senior member of staff

☑ Yes