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 2023

Project Reference Number

NIA_NGN_360

Project Registration

Project Title

Supporting Off-Grid Communities

Project Reference Number

NIA_NGN_360

Project Licensee(s)

Northern Gas Networks

Project Start

July 2023

Project Duration

1 year and 2 months

Nominated Project Contact(s)

sdacre@northerngas.co.uk

Project Budget

£174,897.00

Summary

Currently, there are circa 2,000 properties across the UK that are ‘off-grid’, meaning they are without access to both electricity and gas mains/ grid connections. A range of socio-economic challenges are faced by people living ‘off-grid’, including being at greater risk of fuel poverty, and struggling to adequately heat their homes. Network Operators are seeking to better understand the realities and practicalities of decarbonizing off-grid properties and the likely impacts on occupants.
Objectives of the project are as follows:
Identify policy and regulatory frameworks within which decisions about the decarbonisation of off-grid communities will be made
Understand the nature of off-grid communities from a physical, social, cultural and infrastructural perspective
Review possible decarbonisation solutions for off-grid communities, considering technical, financial, social, cultural and geographical barriers

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

The residential sector is the fourth-largest source of carbon emissions in the world, and accounts for a quarter of emissions in the UK. Off-grid properties represent a form of ‘hard to treat’ property. It is estimated that Hard to decarbonize (HtD) homes are responsible for over 25% of all direct residential sector emissions. Such homes have physical, locational, and occupant-related characteristics that impact the feasibility of deploying available cost-effective decarbonization solutions within them. These solutions include measures that improve energy efficiency and motivate better use of energy as well as low-carbon heating (and cooling) technology options. The impetus for urgent research into HtD homes lies in the fact that while it is widely accepted that all homes will need to be fully decarbonized by 2050, it is unknown how this will be achieved in a quarter of them — the HtD subset of the residential stock in which off grid properties sit. But the problem goes beyond the missed decarbonization potential. It is also one of societal equity; occupants of HtD homes pay a high price to live in them. In the absence of effective and affordable decarbonization solutions, occupants of HtD homes will be less likely to be able to escape fuel poverty and more likely to be excluded from the opportunity to access the benefits of

the Net Zero transition.
The energy networks (DNOs/GDNs) have suggested to BEIS that for communities off the gas and electricity grid, a whole community solution must be designed and facilitated, rather than incentivizing or obligating individual homes or businesses. DNOs/GDNs need to understand the realities and practicalities of decarbonizing a small population, to understand the benefits of whole community solutions and the likely reaction of and impacts for end consumers associated with the most viable and acceptable decarbonisation solutions available.

Method(s)

The project will:
Identify the current and likely future policy and regulatory frameworks within which decisions about the decarbonisation of off-grid communities will be made
Aim to fully understand the nature of the identified off-grid communities from a physical, social, cultural and infrastructural perspective
Identify and assess all possible decarbonisation solutions for the case study communities, considering technical, financial, social, cultural and geographical barriers
Engage with up to 30 households living off grid in the case study locations to understand the full range of energy demands associated with their lifestyles and gain their feedback on the acceptability, practicability and affordability of the identified decarbonisation solutions.
Engage with key stakeholders to inform a final assessment of most viable and replicable options and develop recommendations.
Identification of full system decarbonisation, for example, how do we link connections to the requirements for EV/H2/delivery vehicles.
Explore whether there are assets within the case study communities which could be harnessed to decarbonisation and future energy provision options.
To support the delivery of the project, the following will be undertaken:
Evaluate the effectiveness of the DNO's and GDNs' existing capabilities and procedures against regulatory requirements and expectations detailed in OFGEM's Consumer Vulnerability Strategy to support vulnerable customers and communities in off grid settings.
Assess the GDNs' existing or planned ability to deliver enhanced commitments they may have made within their RIIO-2 submission.
Where relevant, the evaluation will highlight gaps in existing or planned capability and offer recommendations on how these could be mitigated. Recommendations will include items for direct DNO/GDN action and how the DNOs/GDNs could interact with the regulator to influence future strategy.
Examples of good practice will also be identified and assessed to investigate how these could be further improved to enhance performance.

We will explore the likely impact of energy transition options (beyond 2026) on off-grid households and communities by undertaking a broad literature review and engaging with professional stakeholders to identify the technologies most likely to be deployed in the UK. In addition, their viability in off grid settings and their implications for host communities, particularly the most vulnerable amongst them, and DNOs/GDNs will also be assessed. Based on the findings, recommendations for maximising the impact of these technologies on the resilience of the network as a whole is also planned, which will in turn enhance provision to vulnerable customers and communities living in off grid settings.

The following outlines how the project will meet measurement and data quality objectives, in line with RIIOGD2 NIA governance requirements and ENIP; including the measurement procedures and techniques, and mechanisms to ensure the traceability, reliability and comparability of the measurement result.

There will be a number of outputs associated with this project focusing on two specific areas, technical and social. Success from a social research integrity point of view involves capturing a detailed understanding of current and future energy needs and aspirations from a diverse range of up to 30 households living in remote rural locations. This will rely on the support of NGN and NPG to help identify and connect with community groups within off grid communities. From a technical perspective it will be the production of options, which will be presented, discussed and agreed with NGN and NPG at key touchpoints throughout the project to ensure that nothing which is either technically or financially unachievable or does not meet the scope is produced.

CRESR will hold the data (including personal data used to profile respondents) for research participants (professional stakeholders and residents) who we engage with as part of the project. As holders of framework agreements with multiple UK government departments and the NHS, CRESR maintain accreditation to the highest standards of Information Governance. CRESR have full accreditation through the NHS Data Security and Protection Toolkit and Cyber Essentials accreditation, and all personal data will be handled in line with the requirements enforced by these accreditations. Data will be captured through meetings and interviews. Specific addresses of individuals will not be referenced, and findings will, where possible, be generalised. This will ensure that GDPR regulations are not contravened.

No personal identifying data will be generated via this project. The project will evaluate potential decarbonised solutions for specific off grid community scenarios within NGN/NPg's geography's, therefore will not be directly applicable to other GDN/DNO customers, however the output report will provide recommendations and knowledge that will be transferrable

Scope

Data Collection/Interrogation
Production of archetypes, user profiles, identify household and community level factors
Establishment of Stakeholder Panel
Engage with ~30 households across the case study locations
Modelling and Energy Provision Options
Report detailing the decarbonisation options identified
A series of simplified explanations of the main options and possible pros and cons will be produced to support consultation with households
Conclusions and Recommendations
Final report incl. preferred solutions
Presentation of final report and any amendments made

Objective(s)

Identify end users for the research
Fully understand the nature of the identified off-grid communities from a physical, social, cultural, economic and infrastructural perspective.
Detailed profiling of the off-grid stock within the geographical region to be considered, including occupants and the community context in which they operate, property types and current energy arrangements. To be completed ensuring that Stages 3&4 are evidence based and set firmly in context.
Establish a stakeholder panel to represent key stakeholders and provide insights into the needs, experiences and preferences of off-grid communities (government, regulators, DNOs, those representing end users).
Utilise the data generated to identify and assess all possible decarbonisation solutions for the case study communities, considering technical, financial, social, cultural and geographical factors. The options identified should take account of technical feasibility, cost, end user needs and lifestyles (present and future) and fairness to occupants, particularly more vulnerable households in or at risk of FP.
Identify potential decarbonisation solutions, consider whether there are any by-products, such as manure, that might be used as an asset in this context. As part of this assessment, any additional added value which could be leveraged by specific solutions for the community at large will be considered and presented, for example, H2 production from a farm has the potential to create a refuelling hub to facilitate H2 mobility.
Return to a representative sub-set (~10) of the 30 households living off grid in the case study locations to gain their feedback on the acceptability, practicability and affordability of the identified decarbonisation solutions.
Engage with the stakeholder panel to help inform a final assessment of the most viable and replicable options, taking account of occupant's perspectives.
Use all data to generate recommendations identifying the most beneficial and fair solutions for different property types, their occupants and the wider communities in which they sit.
Aim to identify full system decarbonisation, for example, how do can domestic connections be linked to personal, societal and commercial requirements, including future reliance on for EV/H2 vehicles. It is acknowledged that these solutions may benefit more than one community and unlock further investments.
Assess the decarbonisation solutions explored for the case study communities, considering technical, financial, social, cultural, geographic and logistical factors. Wider replicability and likely timelines for deployment will also be considered.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Adoption of the identified solutions could directly benefit customers by providing feasible alternative energy supply options which supports the UK's net zero commitments. Customers should benefit from potentially reduced future energy costs and improved reliability of future supply to current off-grid communities.
The project will enable a better understanding of the energy needs (current and future) of off grid customers, helping to improve the responsiveness of service provision/ interventions to their needs. By sharing project outputs and collaboration, the project will provide solutions that directly benefit vulnerable customers who live in a variety of off-grid communities throughout the UK.

Success Criteria

A final report will be produced containing background, methods/ approach, discussion of findings from each stage of the research,

presentation of preferred options and assessment of replicability (highlighting limitations) and commentary on the policy and regulation they will rely on.
The project outputs will provide evidence and knowledge to network operators to help evaluate and justify future network developments that best support customers in off-grid communities to achieve net zero commitments through the most efficient, feasible and responsible decarbonisation transition.

Project Partners and External Funding

Northern Gas Networks (NIA Funding) (Lead)
Northern PowerGrid (NIA Funding) (Partner)

Potential for New Learning

The completion of this project will provide new insight and information on the most appropriate and acceptable decarbonisation options that exist and can be applied to the off-grid stock within the geographical locations identified in conjunction with NGN, NPG. The project will also provide NGN, NPg as well as all DNOs and GDNs across the UK with opportunities for new learning about the nature and needs of off-grid communities and their current and likely future ways of life and the implications for energy provision, as well as the feasibility of the decarbonisation solutions currently available and relevant to these communities.

Scale of Project

This project will look to involve stakeholders from across the North of England in NGN's and NPg's licence areas, including direct engagement with approximately 30 households in the region.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Northern England - NGN & NPg Operating Areas.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Total NGN External Eligible NIA Costs £79,498.75

Total NGN Internal Eligible NIA Costs £7,949.87

Total Overall NGN Eligible NIA Project Costs £87,448.62

Total NPg External Eligible NIA Costs £79,498.75

Total NPg Internal Eligible NIA Costs £7,949.87

Total Overall NPg Eligible NIA Project Costs £87,448.62

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:

This project will support with better understanding of how vulnerable customers in off-grid communities will be impacted by future energy network scenarios.

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

Customers should benefit from potentially reduced future energy costs and improved reliability of future supply to current off-grid communities.
The project will enable a better understanding of the energy needs (current and future) of off grid customers, helping to improve the responsiveness of service provision/ interventions to their needs. By sharing project outputs and collaboration, the project will provide solutions that directly benefit vulnerable customers who live in a variety of off-grid communities throughout the UK

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)

RIIO 1 Projects only, so N/A

Please provide a calculation of the expected benefits the Solution

As this project is research driven, the current proposed project will not result in immediate/direct cost benefits. The project outputs will provide evidence and knowledge to inform future investment costs for both DNOs & GDNs to enable cost efficient decarbonisation opportunities for existing off grid communities.

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

Currently, there is understood to be approximately 2,000 properties across the UK that are 'off-grid', meaning they are without access to both electricity and gas mains/ grid connections.

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

This will be better understood following project closure, overall costs will be dependent on the relevance of a proposed solution that will enable decarbonised off grid communities.

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 project will enable a better understanding of the energy needs (current and future) of off grid customers, helping to improve the responsiveness of service provision/ interventions to their needs. Project outcomes & recommendations will be collated into a final report and will be available to GDNs &DNOs to enable sharing of project outputs for collaboration, the project will provide solutions that directly benefit vulnerable customers who live in a variety of off-grid communities throughout the UK.

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.

It is understood that there is no existing methodology or project completed or underway that is holistically evaluating potential decarbonisation options for off grid 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 project will evaluate real world off-grid communities and identify current and future technology requirements to enable a cost efficient and feasible decarbonisation of their energy supplies, which is not currently completed as a BAU activity by the collaborating network partners.

Relevant Foreground IPR

- TT, CRESR, NPG and NGN are expected to generate Foreground IP knowledge, resulting from the research and creation of stakeholder group with key project stakeholders and subject matter experts.
- TT, CRESR, NPG and NGN is expected to generate Foreground IP knowhow, resulting from profiling of the off grid housing stock and occupants and development of solutions for connecting off-grid customers.
- This project and the resultant outcomes/deliverables will conform to the default treatment of IPR as set out under the agreed NIA Governance (where the default requirements address two types of IPR: Background IPR and Foreground IPR).

Data Access Details

Interested parties will be able to access relevant project outputs via the usual routes (ENA Smarter Networks Portal).

For all data access requests, please follow the guidance set out in Northern Gas Networks Innovation Data Sharing Policy https://www.northerngasnetworks.co.uk/ngn-you/the-future/our-funding/

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

The project will evaluate potential solutions for decarbonisation that are new & novel and may not potentially be deployed as BAU, specifically, this is also providing greater support for customers within the networks geographic regions, however may not be connected to both gas & electricity networks.

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 project will providing greater support for customers within the networks geographic regions, however the customers may not be connected to both gas & electricity networks, therefore, other than emergency services there is no regulatory or operational requirement to provide this evaluation under BAU, therefore requires use of NIA to evaluate.

This project has been approved by a senior member of staff

☑ Yes