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

Oct 2020

Project Reference

NIA_UKPN0066

Project Registration

Project Title

CommuniHeat

Project Reference

NIA_UKPN0066

Project Licensee(s)

UK Power Networks

Project Start

October 2020

Project Duration

1 year and 9 months

Nominated Project Contact(s)

Ashita Anand

Project Budget

£919,688.00

Summary

Currently there are 4 million homes off the gas grid in UK and many of them are clustered in rural areas/villages. Of the 4 million homes, approximately 1.6 million rely on oil as their primary source of energy (and the rest mainly using electricity or Liquefied Petroleum Gas). In order to meet the Net Zero target, the off-gas grid community needs to transition fast. With no existing gas infrastructure and clarity in government policy to phase out carbon intensive heating methods, electrification of heat is deemed the most feasible and cost effective solution to decarbonise such communities. However, these communities need to overcome significant barriers with technology investment and electricity network capacity on their route to Net Zero emissions. Factors such as capital hurdle and disruption to customers need to be addressed and DNOs are required to find cost effective and future-proof network readiness solutions. A least regrets roadmap for transition must be defined.

Nominated Contact Email Address(es)

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Problem Being Solved

Currently there are 4 million homes off the gas grid in UK and many of them are clustered in rural areas/villages. Of the 4 million homes, approximately 1.6 million rely on oil as their primary source of energy (and the rest mainly using electricity or Liquefied Petroleum Gas). In order to meet the Net Zero target, the off-gas grid community needs to transition fast. With no existing gas infrastructure and clarity in government policy to phase out carbon intensive heating methods, electrification of heat is deemed the

most feasible and cost effective solution to decarbonise such communities. However, these communities need to overcome significant barriers with technology investment and electricity network capacity on their route to Net Zero emissions. Factors such as capital hurdle and disruption to customers need to be addressed and DNOs are required to find cost effective and future-proof network readiness solutions. A least regrets roadmap for transition must be defined.

Method(s)

CommuniHeat will undertake research, engagement and desktop based assessments to inform the most suitable approach to decarbonise heat for off-gas grid communities. Specifically, the project will focus on an off-gas grid community in Barcombe, East Sussex to develop a roadmap scalable to other similar communities across GB. The project will identify how to best support Barcombe to decarbonise at the lowest overall cost, while reducing their energy needs and maintaining their heating comfort.

The CommuniHeat project method is in line with the Local Area Energy Plans (LAEP) method referred to in Ofgem's RIIO-2 Business Plan Guidance.

Scope

The research will apply to the Barcombe area in South Eastern Power Networks' region to gain insights and qualitative & quantitative understanding of the impact electrified heat has on electricity distribution networks. The added value of the project will come from incorporating and understanding network and customer impact from EV uptake, renewables options, and distributed energy resources alongside decarbonisation of heat. CommuniHeat aims to deliver a cost-effective and least regrets roadmap for facilitating the transition of off-gas communities to electrified heat.

Objective(s)

The objectives of the project are:

- Develop an understanding of the network impact of low carbon heat solutions;

- Develop a clear understanding of the potential value of an LAEP approach in delivering value to both the customer and DNO as compared to an uncoordinated approach;

- Develop a viable and replicable approach to LAEP which will enable the transition to Net Zero carbon for off-gas communities throughout GB;

- An appraisal of the impact of different commercial and technical approaches and their effect on network reinforcement requirements, reliability and cost to consumer; and

- An assessment of any regulatory and policy barriers for deployment which if addressed would deliver significant benefits to customers and network.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be deemed successful if we have:

- An assessment of the network impact of combinations of different low carbon heat solutions;

- Modelled scenarios based on real community and network data with detailed insights report comparing a coordinated approach for low carbon heat including community assets vs an uncoordinated approach without community assets;

- A developed methodology for LAEP which is specifically tailored to be applicable to other off-gas grid communities;

- Techno-economic analysis of a range of low carbon heat solutions applicable to off-gas grid communities which includes provision for different commercial models affecting cost and accessibility of heat solutions; and
Clearly defined insights and a set of recommendations to inform policy and DNO business planning activities where clear benefits in reducing network impact and improving customer value could be derived from adjustments to current policy and regulations.

Project Partners and External Funding

The project will be delivered in partnership with OVESCO and BuroHappold. Community Energy South (CES) will be acting as a subcontractor to OVESCO.

OVESCO has secured £40,000 of stage 1 Rural Community Energy Funding (RCEF) from the Department for Business, Energy & Industrial Strategy and Department for Environment, Food & Rural Affairs. This is to look at the feasibility for a solar farm located in the Parishes of Barcombe & Ringmer. Findings from this feasibility study will build understanding of the viability of solar at Barcombe, a valuable input under CommuniHeat's coordinated plan scenario analysis.

OVESCO and BuroHappold are contributing approximately 24% and 22% respectively of their costs in order to complete this project.

Potential for New Learning

For off-gas grid communities, the project expects to generate the following learnings:

- Network impact from low carbon heat in off-gas grid communities;
- Demonstrate the value of LAEP approach for DNOs and customers compared to the individual heat pump uptake approach;
- Different technical approaches assessing range of low carbon heat solutions applicable to off-gas grid communities and, and associated costs and accessibility of heat solutions affected by different commercial approaches;
- How other off-gas grid and rural communities in GB can transition to Net Zero; and
- Identify any potential regulatory and policy barriers.

Scale of Project

The project will cover the Barcombe community in the SPN licence area operated by UK Power Networks. Barcombe is a representative off-gas grid community and learnings from this project can be scaled to other off-gas grid communities in GB.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

This a research project including customer engagement and desktop based assessments of the Barcombe community in the SPN licence area of UK Power Networks.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The project will cost £827,719.20

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)

Currently there are 4 million homes off the gas grid in UK and many of them are clustered in rural areas/villages. Of the 4 million homes, approximately 1.6 million rely on oil as their primary source of energy. In addition to the UK's 2050 Net Zero emissions target goals, the government's Clean Growth Strategy has specifically identified that they "intend to phase out the installation of high carbon fossil fuel heating in new and existing buildings in areas off the gas grid, during the 2020s"[1] Therefore, CommuniHeat assumes cost of community uptake is only expected in the first couple of years of ED2 because with the coordinated approach, it is assumed that all customers can be switched over to electricity in a two year period which is when the network reinforcement costs and therefore savings will be realised. CommuniHeat compares the cost of coordinated versus uncoordinated scenarios and expects a £200,000 savings in network reinforcement costs to decarbonise Barcombe, and £120 million savings to decarbonise off gas grid customers in the UK Power Networks area.

Government of UK Heat in Buildings: https://www.gov.uk/government/groups/heat-in-buildings

Please provide a calculation of the expected benefits the Solution

N/A – this is a Research Project.

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

This will be applicable across GB. Currently there are 4 million homes off the gas grid in UK and many of them are clustered in rural areas/villages. All of these communities could benefit from the learnings generated by CommuniHeat.

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

As compared to the CommuniHeat project costs, the design element and implementation of the methodology (which can be used to appraise individual communities or groups of communities in the form of an area plan), it is anticipated the cost will be 25-35% less than it will be for CommuniHeat for a detailed feasibility study and LAEP. This would be higher or lower depending on the scope, level of involvement, level of detail and quality of data available.

Economies of scale are also a consideration here because there is a potential for a single LAEP to be applicable across a number of 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

n/a

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

☑ 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.

Below are a few projects that touch on off-gas grid communities. These provide insights into the decarbonisation of heat and some test the LAEP method, however, none provide the holistic view for an off-gas grid community that CommuniHeat provides with the added consideration of transport, renewables, and storage.

The Electrification of Heat Demonstration Project by Energy Systems Catapult, Delta-EE and Oxford Computer Consultants (funded by BEIS): This project aims to confirm the feasibility of a large-scale roll-out of heat pumps in Great Britain by installing the low carbon technology in 750 homes, alongside new products and services designed to overcome barriers to deployment. The majority of these will be for on the gas grid customers.

Local Area Energy Planning - Insights from three pilot local areas by Energy Systems Catapult: This project emphasizes the importance of LAEPs. The three pilot areas focused on did have a component of off-gas grid customers, however, they made up a

small portion (between 3%-8%) of the residents and therefore not the focus of the study.

Swaffham Prior Renewable Heat Network Feasibility Study by Bioregional and Carbon Alternatives: This project explores decarbonisation of heat using heat networks in Swaffham, an off-gas grid community. While CommuniHeat will explore heat network as an option for decarbonisation for Barcombe, it is one of many options being considered.

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 make a comparison of uncoordinated individual heat pump uptake scenario with a coordinated community approach to find the optimal network, technological, and economic solution for heat decarbonisation of off-gas grid customers. It will use a whole system approach to understanding heat decarbonisation, including EVs, renewables, and distributed energy resources specifically for an off-gas grid community. This type of project has not been tried before partly because national agenda previously prioritised other topics ahead of off-gas LAEP schemes. However, in Ofgem's recent overview of RIIO-ED2 Sector Specific Methodology Consultation (SSMC), decarbonising off-gas grid and facilitating delivery of whole system solutions was emphasized. Further, SSMC contemplates the best approach to decarbonise off-gas grid communities (heat pump penetration vs. heat networks). The CommuniHeat will study a variety of options to recommend which ones may be the most appropriate for an off-gas grid community. Off-gas grid is a key area that can accelerate decarbonisation of heat given the fuel that is being used currently. Oil boilers contribute to very high carbon emissions as compared to electricity (almost six times higher as calculated in the CommuniHeat project based on emissions factors reported by BEIS). Therefore, the CommuniHeat project is a step towards decarbonising communities that may be key to meeting the Net Zero targets. 2: https://www.ofgem.gov.uk/system/files/docs/2020/07/riio-ed2_sector_specific_methodology_consultation_overview.pdf 3: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

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

In section 3.2 of the NIA Governance document, the DNOs are encouraged to pursue different types of Methods and Solutions. Looking at whole system coordinated uptake view of off-gas grid heat decarbonisation will identify the issues and opportunities associated with its implementation. Solutions to these issues allowing it to be used in business as usual following the project are expected to be identified. Due to the risk involved in the project and not fully knowing whether the benefits can be delivered across UK Power Networks' licence areas, these activities would not form part of business as usual activities. In order to progress an innovative project which carries significant risk in implementation, additional innovation funding is required as a stimulus.

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

The project can only be undertaken as an innovation research project given the uncertainty of a coordinated community approach and low carbon heating in the future while policy continues to develop. As noted in the NIA Guidance, certain projects are speculative in nature and yield uncertain commercial returns. This is the case for with this project. There is a commercial risk that the research conducted in the project does not lead to more cost-effective low carbon heating adoption or firm Local Area Energy Plans. This could be due to the fact that the solution has not reached the level of maturity required for business-as-usual application. This risk is being mitigated against through early engagement with stakeholders. If the project is successful, it will develop learning to reduce costs of heat decarbonisation for network customers. The specific details regarding the benefits are captured under section 2b of this document.

This project has been approved by a senior member of staff

☑ Yes