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NIA Project Registration and PEA Document

Date of Submission

Jun 2018

Project Reference Number

NIA_WWU_049

Project Registration

Project Title

FreeNonDom

Project Reference Number

NIA_WWU_049

Project Licensee(s)

Wales & West Utilities

Project Start

July 2018

Project Duration

0 years and 3 months

Nominated Project Contact(s)

Oliver Lancaster

Project Budget

£26,667.00

Summary

The Freedom Project (NIA_WPD_023) has been successful in identifying the energy system benefits of the hybridisation of domestic heating systems and has demonstrated delivery of these benefits in a field trial across a range of housing types.

The Freedom Project was restricted to considering purely domestic heating settings, for which PassivSystems expertise and technology was well suited.

In order to complete the picture on the potential of hybrid heating systems to support heat decarbonisation, it is important to assess the viability and performance of the systems in a non-domestic setting. This project considers a feasibility study that will explore how Wales & West Utilities can best gain insight into the potential of hybrid heating systems in the non-domestic market

Nominated Contact Email Address(es)

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Problem Being Solved

- The Freedom Project has delivered rich learnings regarding the flexible use of both gas and electricity networks and the network impacts in the event of large scale take-up of smart controlled hybrid heating technology, such as the avoidance of DNO reinforcement, potential for demand side response and frequency response services, and the changing role of the gas network as the provider of load-shift flexibility and large capacity energy storage.
- The Freedom Project only considered the heat demand from domestic properties; however significant demand comes from the non-domestic market and the potential for their impact on networks from hybridisation needs to be considered with a feasibility study.
- BEIS long term solutions for the decarbonisation of heat now considers four main options to explore: 1) hybrid heating 2) green gas 3) hydrogen and 4) electrification. As gas and electricity networks working together with BEIS on these options, it is imperative that the non-domestic potential for hybridisation is considered.

Method(s)

- Review of the different building types and use types within Bridgend and specifically the Bridgend Council estate portfolio (industrial, large commercial, small commercial for example).
- Draw upon previous Wales & West Utilities work in the area, including consumer willingness and ability to pay.
- Identify the existing range of heating systems used in non-domestic properties.
- Identify any existing control technologies and optimisation strategies.
- Identify the suitability of buildings and their users to switch to using a hybrid heating systems

Scope

- Explore whether with similar control and load management characteristics to those used on the Freedom Project could apply to non-domestic buildings.
- Review all potential heating technologies suitable for use in the non-domestic heating market (including gas heat pumps, air source heat pumps, ground source heat pumps and hydrogen fuels cells).
- Identify potential differences between the control technology solution delivered for Freedom and that which would be required for a range of non-domestic buildings.
- The feasibility study will use a variety of data sources including:
 - Existing data held by Bridgend Council.
 - Information gained from site visits and technology audits.
 - Interviews with building users on current heating system operation including schedule and temperature control.
 - Desktop technical evaluation of existing heating systems and control systems including physical integration points and control protocols.
- Site surveys for the installation of appliances.

Objective(s)

Understand the viability, risks and costs of delivering a proof of concept smart hybrid heating innovation project in the non-domestic market, with indicative whole energy system impacts to explore in such a field trial.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

- Understanding the potential for hybridisation of heat in non-domestic buildings
- Identifying applicable technologies connected to energy networks in delivery of hybrid heat in non-domestic buildings.
- Anticipating potential upstream impacts to energy networks from hybridising non-domestic heat.
- Develop an outline plan for delivery of a limited cross-vector field trial.

Project Partners and External Funding

PassivSystems (no external funding)

Potential for New Learning

The Project is expected to develop the following new learning from the project:

- The potential for untested heating appliances and hybrid heating arrangements and optimised control strategies to deliver comfort requirements for non-domestic buildings as a lowest cost heat for non-domestic consumers now, including potential options for heat/comfort service business propositions.
- The potential for using various signals to smart switch and load shift between gas and electricity networks to provide value from the vast storage within the gas network, dual fuel flexibility value and demand side response and frequency response services – making best use of existing utility assets, avoiding generation capacity and DNO reinforcement costs and avoiding the cost and disruption of internal building retrofits otherwise needed for low-temperature heat delivery.

Scale of Project

This project is done at the relevant scale, which is a desk top study. The impact of this study, if successful, will be to inform a further stage in this project with potential for a trial installation demonstrator project.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This is a desktop study focussing on non-domestic properties in Bridgend; however, its learnings will be applicable UK wide and beyond with global interest in smart hybrid fuel flexibility.

Revenue Allowed for the RIIO Settlement

Not Applicable

Indicative Total NIA Project Expenditure

External Expenditure: £20,000

Internal Expenditure: £6,667

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)

No firm cost savings will be influenced as an outcome of this project, however an indicative saving will be explored. The potential savings are highly variable depending upon the appliances used in a non-domestic hybrid setting.

Please provide a calculation of the expected benefits the Solution

n/a

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

Subject to a beneficial outcome for this study, there is a potential for hybridised heating to be applied to all non-domestic buildings across GB. Large industrial consumers are not expected to benefit, but any potential will be captured.

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

The final report will share the learning identified and will be applicable to GB. The outputs of the research project will indicate potential further research and innovation.

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

A project report will be compiled detailing the findings of this project and will be disseminated to all energy networks through the portal, as well as included in publications and presentations at relevant industry events. Evidence will also be provided to UKCC and to BEIS to support the emerging development of a long term heat policy. This learning will then be referenced and taken into a further project phase if it is deemed appropriate, with opportunities for cross-vector collaboration.

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.

A review of all other Network Licensees Innovation Funding Incentive annual reports has been performed and no similar Projects have been identified. This smart hybrid control approach is globally leading.

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

With all the focus being on decarbonising domestic heat as well as ways to decarbonise industrial heat, the non-domestic sector (commercial and light industrial) has been largely ignored. There is a potential to hybridise heat demand for these properties on a wide scale to make the most of electrification, backed up by gas. With different heat demand patterns and times of use, there is a wider range of appliances to deliver fuel flexibility, each with different consequences on the energy network demand profiles and storage requirements.

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 feasibility study to understand whether hybrid solutions are appropriate in industrial and commercial applications. As the outputs are unknown this is a risk to Wales & West Utilities.

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 temporal flexibility of accessing NIA allows for timely delivery of innovation. Other sources of funding are rigid and are considered and delivered over an extensive timeframe – none of which support the development of facts and evidence quickly enough to input into policy decisions or to begin positively impacting on consumers bills in the nearer term.

This project has been approved by a senior member of staff

Yes