

NIA Project Registration and PEA Document

Date of Submission

Oct 2019

Project Reference Number

NIA_SSEN_0039

Project Registration

Project Title

An Electric Heat Pathway – Looking Beyond Heat Pumps

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NIA_SSEN_0039

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

October 2019

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Joe McNeil

Project Budget

£33,400.00

Summary

In the ongoing debate about future energy policy, it appears there has been a presumption of any electrified heat pathway being based around the use of heat pumps. It is deemed essential to establish a pragmatic solution to the immediate problem of RTS switch-off and a long term model which will allow electric storage heating to play an appropriate role in heat decarbonisation and the shift to a smart, flexible electricity system. This project intends to be the important first step in addressing that.

Nominated Contact Email Address(es)

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Problem Being Solved

In the ongoing debate about future energy policy, it appears there has been a presumption of any electrified heat pathway being based around the use of heat pumps. A heat pump works by transferring heat from a source such as air, water or the soil in a garden to a sink such as the hot water system in a home. It uses electricity and is very efficient since the heat produced is significantly higher than the energy consumed. This and several other advantages make heat pumps a popular choice of low carbon technology (LCT). However, there are aspects of heat pumps which make them unsuitable in some homes. The upfront costs of converting to heat pumps are relatively high. Space and other practical constraints also limit their suitability for smaller or poorly insulated homes. The impact of the foregoing challenges on low income households is to make gas heating attractive due to potential for reduced energy bills and mitigation of fuel poverty. In the long term, however, further adoption of gas would protract the decarbonization of heat.

An alternative to heating pumps is electric storage heating. Storage heaters have been around for decades and are a low cost way of heating which draws power at night and retains it for use the next day. Due to this, storage heating has great potential as a more viable alternative for households on low incomes and at risk of fuel poverty. Given the emphasis placed on 'flexibility' in the low carbon energy system, the role which could be played by electric storage heating needs to be given greater consideration. SSEN has considerable experience of utilising the flexibility provided by storage heating through Radio Tele-switching Service (RTS) of heating demand to manage constraints and defer network reinforcement and from the NINES project. The smart meter rollout and impending decommissioning of the associated BBC long wave signal will likely make RTS obsolete. This opens up the debate about the roles of different parties (DSOs, suppliers, aggregators) in the provision of flexibility services to fully exploit the benefits available from the RTS alternative going forward. It is deemed essential to establish a pragmatic solution to the immediate problem of RTS switch-off and a long term model which will allow electric storage heating to play an appropriate role in heat decarbonisation and the shift to a smart,

flexible electricity system. This project intends to be the important first step in addressing that.

Method(s)

This project will be delivered through a desktop report study using industry and SSEN expertise relating to the control, operation and use of domestic electric storage heating. This report will be augmented by interviews and workshops with individuals who have expertise in this area. The report will set out the benefits of and barriers to electric storage heating playing a part in the overall heat decarbonisation strategy. In addition, the options for commercial models for how it can be taken forward will be provided.

Scope

The scope of the project is to carry out a desktop study which will produce a written report to help network licensees gain a better understanding of the opportunities and benefits of flexible heating demand.

Objective(s)

It is anticipated that the report from this project will, among other things:

- Stimulate public debate on storage heating, an important but often overlooked element of energy policy
- Provide better understanding of the opportunities and benefits of flexible heating demand, and how best to implement them
- Influence internal policy changes in SSEN and use the report to lobby for change at a wider industry level

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

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

Project Partners and External Funding

None

Potential for New Learning

The project will cover the following:

1. Assessment of the heat decarbonisation challenge with regard to fuel poverty. This should consider how the size and type of property will affect the type of heating solution from a customer's perspective
2. The role of flexibility/controllability of heating load in the DSO transition
3. Evidence of the benefits that modern smart electric storage heating can deliver for networks
4. Evidence of the consumer benefits of modern smart electric storage heating
5. A review of commercial models including active control versus price signals as well as who is best placed to coordinate and manage the control, operation and use of domestic electric storage heating between RTS (DSO control), aggregator (providing services to DSO), supplier (price signals) or market driven.

The information and learning from this project will be disseminated through written publications and external web channels and is applicable to all Distribution Network Licenses who manage and control electric storage heating systems.

Scale of Project

The project is a small-scale desktop study whose deliverable is a written report considering a GB context.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

Scottish Hydro Electric Power Distribution network area and Southern 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 £33,400. 90% (£30,060) of which is allowable NIA expenditure.

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)

If the problem is addressed, the imminent challenge of the RTS switch-off will be mitigated thereby preventing network reinforcement, which is likely to be necessary if the current flexibility cannot be exploited. This would save millions of pounds in deferred costs. In addition, if storage heating is deemed to play a more prominent role in future energy policy and the recommendation is adopted, the carbon abatement costs will be reduced significantly through less initial capital outlay. Across GB, savings could go into several hundreds of millions.

Please provide a calculation of the expected benefits the Solution

Not required for this research project

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

Heat decarbonisation is a universal challenge, 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 learning from the project will be directly relevant and transferable to other license areas which may be looking at using flexible smart heating as a means of managing network constraints prior to reinforcement.

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, LCNE, 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 smarter networks portal and other publicly available sources of literature have 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

This is a new initiative which will provide improved learning and understanding relating to the future and continued benefits of domestic electric storage heating across the industry in relation to both the electric heat pathway and potential impact on fuel poverty.

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

The results from the project may impact on the entire industry not just SSN, the business therefore needs to fully understand the results from the report and share these as appropriate.

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

Electric Storage Heating impacts on the lives of many domestic consumers across all UK Networks. The ability to control and operate this source of heating in an efficient manner, specifically understanding the impact on fuel poverty has significant implications. NIA is therefore deemed the most suitable framework to produce this report and thereafter disseminate the learning to other interested parties.

This project has been approved by a senior member of staff

☒ Yes