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## NIA Project Registration and PEA Document

### Date of Submission

Jul 2020

### Project Reference Number

NIA\_UKPN0061

## Project Registration

### Project Title

Heat Street: Local System Planning

### Project Reference Number

NIA\_UKPN0061

### Project Licensee(s)

UK Power Networks

### Project Start

July 2020

### Project Duration

1 year and 2 months

### Nominated Project Contact(s)

Rona Mitchell

### Project Budget

£318,652.00

## Summary

Heat Street is a research project that aims to develop an approach to forecasting adoption of energy efficiency measures and low carbon heating solutions. The project will also carry out a zoning assessment to gain insight on what areas may be particularly well-suited to electrifying their heating needs.

### Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

## Problem Being Solved

According to the UK Power Networks Distribution Future Energy Scenarios (DFES), by 2028 there will be a 10-fold increase in the amount of heat pumps connected to our network (from 28,731 in 2020 to 253,014 in 2028 in the 'Steady Progression' DFES scenario).

Heating accounts for over a third of UK CO2 emissions, so this sector must be decarbonised to achieve the Net Zero target of 2050. As the policy continues to develop, there is an uncertainty in the short term decarbonisation pathway for the UK; however full electrification is deemed to be the most feasible long term solution at this point in time. To plug the gap in this fast-moving space, there is a need to conduct a research project to identify gaps in existing framework for DNOs to facilitate the decarbonisation of heat at best value to society.

## Method(s)

Through research, stakeholder engagement and desktop study, the project aims to develop:

- An approach to forecasting adoption of energy efficiency measures and low carbon heating solutions. The project will test this approach in the UK Power Networks licence areas and produce geospatial forecasts;

- Learning on the relationship between energy efficiency roll-out and heating demand;
- Scenarios for different levels of DNO involvement in energy efficiency deployment;
- Customer segmentation for heating;

· The project will also carry out a zoning assessment to gain insight on what areas may be particularly well-suited to electrifying their heating needs. Criteria such as regulatory considerations, geospatial, fairness, practicality and speed will be included in the assessment.

## Scope

The research will apply to all three of UK Power Networks' licence areas, and will cover domestic, industrial and commercial buildings. It will include conducting stakeholder workshops and bilaterals to inform performance criteria and forecast assumptions. The scope of forecasting will be from now until 2030. If value can be demonstrated, these forecasts may be extended further.

## Objective(s)

The objectives of the project are to:

- Collate existing information in a way which is useful for energy networks to progress their thinking on the decarbonisation of heat;
- Develop understanding of trends and dependencies for energy efficiency and low carbon heating implementation; and
- Develop and conduct a zoning assessment with input from stakeholders to understand how to identify where customers will benefit most from installing electric heating solutions.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

The project will be deemed successful if:

- A forecast is developed for the uptake of identified energy efficiency measures and low carbon heating solutions for different customer segments;
- The information and insights can inform the role of DNOs in the decarbonisation of heat to facilitate the transition for customers; and
- A zoning activity is completed to outline regions that are suitable for the uptake of a certain heating technology or energy efficiency measures.
- The research gives greater clarity and confidence for DNOs to understand how to facilitate integrated local area planning in the medium to long-term.
- Learnings are developed to improve customer experience for those wishing to electrify their heating systems in the short-term

## Project Partners and External Funding

Element Energy will support the delivery of this work. Other project partners may be identified throughout the project. There is no external funding.

## Potential for New Learning

The project expects to generate the following:

- Summary of current building stock energy efficiency levels
- Cost-benefit analysis of energy efficiency measures
- Geospatial heat demand models for different levels of energy efficiency uptake
- Low carbon heating technology adoption forecast
- Customer segmentation analysis
- Summary of zoning assessment and recommendations on optimal technology mix
- Network load assessment based on the low carbon heating adoption forecast and for different levels of energy efficiency uptake.

A number of documents summarising the approach and key findings from the project will be published.

At least one dissemination event is planned to share project learning.

### **Scale of Project**

The project will cover all three licence areas operated by UK Power Networks. This will enable to gain specific learnings from urban to rural areas.

### **Technology Readiness at Start**

TRL2 Invention and Research

### **Technology Readiness at End**

TRL3 Proof of Concept

### **Geographical Area**

This is a desk-based research project. The research will cover all of UK Power Networks' licence areas.

### **Revenue Allowed for the RIIO Settlement**

None.

### **Indicative Total NIA Project Expenditure**

The project will cost £286,786.80

## 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 approximately 850,000 low carbon heating systems (biomass boiler, electric storage, heat pump, hybrid heat pump and micro CHP) across the UK Power Networks licence areas. Storage and heat pumps account for 99.8% of these.

By 2028, we forecast a 35-42% increase in low carbon heating systems (DFES numbers, the range forecasted across the three scenarios Steady Progression, Green Transformation and Engaged society):

<https://innovation.ukpowernetworks.co.uk/2020/02/06/distribution-future-energy-scenarios/>

On average it costs £10,000 to make the swap to low carbon heating, and then an ongoing £200 per year more to run it than gas heating at current costs. (Point 5.30 the BEIS report 'Clean Growth: Transforming Heating – Overview of Current Evidence 2018) [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/766109/decarbonising-heating.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766109/decarbonising-heating.pdf)  
For customers:

Considering the forecasted range of possible increase above, estimated benefits are calculated using 40% as an approximation.

40% increase\*850,000\*£10,000= £3.4bn spent on low carbon heat systems in RIIO ED2

40% increase\*850,000\*£200 = £68m spent annually on higher opex for low carbon heating systems from the end of RIIO ED2.

If the learning from this project can lead to a 10% increase in energy efficiency rollout, which in turn reduces heat requirement by 10% - customers would save an estimated £680,000 annually.

If the benefits due to taking a zoning approach can reduce the installation cost of low carbon heating systems by an estimated 10% across 5% of installations, customers would save an estimated £17m between now and the end of RIIO-ED2)

The project will lay the foundations for in-depth analysis on network impact of the electrification of heat. This will assist in the identification of relevant 'smart solutions', which can potentially defer reinforcement and deliver savings for DNOs in ED2.

#### 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. UK Power Networks has 28% of GB customer totals. It is estimated that benefits would be proportional to customer numbers.

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

This project covers one of six DNO groups. Rolling out the method across GB would require network licensees to:

- research building archetypes in their areas,
- assess the customer segments, and
- conduct zoning assessments with information relevant to their areas.

The cost of rolling the method across GB is estimated at £250,000.

## 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

Decarbonisation of heat is relevant to all energy networks in GB. The learning generated around energy efficiency will be applicable to all DNOs and GDNs. The learning around low carbon heat adoption will be particularly relevant to all DNOs.

### 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.**

There have been no projects carried out to look at the future impact of heat decarbonisation on DNOs in GB. The project team has reviewed other projects which have been carried out, and will build on their knowledge and lessons learned to maximise the value from this research project.

Projects that have looked at energy efficiency:

SAVE - SSEN  
energywise - UKPN  
Firefly - UKPN

SAVE, energywise and Firefly looked at the impact of energy efficiency interventions on domestic properties. This project will build on the learnings and conduct research into commercial and industrial properties.

Projects that have looked at decarbonising heat

Low Carbon London - UKPN  
An Electric Heat Pathway – Looking Beyond Heat Pumps - SSEN  
4D Heat – National Grid  
NINES - SSEN

Low Carbon London investigated the impact of a wide range of low carbon technologies. Electric Heat Pathway, 4D Heat and NINES all looked at flexible/smart heating solutions. This project will build on the learning from these projects and conduct research on the interdependencies of low carbon heating technologies and energy efficiency levels of properties. This project will also consider industrial & commercial properties as well of domestic, which have been the primary focus of other projects.

Projects that have looked at zoning:

Energy Systems Catapult (ESC) Smart Systems and Heat, Phase 1 and Phase 2

<https://es.catapult.org.uk/impact/projects/smart-systems-and-heat/smart-systems-and-heat-phase-2/>

The ESC Local area energy planning project conducted assessments for Newcastle, Bridgend and Greater Manchester. The project developed a framework to enable local governments to identify “the most promising, cost effective options for decarbonisation whilst highlighting where investment is needed”

This project looks to build on the learning from the ESC project and conduct a zoning assessment for the three UK Power Networks licence areas to support any local authorities within the regions who wish to carry out a local area energy plan.

### **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 use of DNO-led zoning as a way to identify what areas are mostly likely to decarbonise their heat via electrification has not been tried in GB before. Although energy efficiency through flexibility arrangements could be used currently, this project looks at the intersection between energy efficiency and heat decarbonisation, of which there is very little available information.

### **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 energy efficiency interventions and heat decarbonisation in GB 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 uptake of energy efficiency measures 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 increased energy efficiency take-up, 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