SIF Discovery Round 2 Project Registration

Date of Submission

May 2023

Project Reference Number

10061572

Project Registration

Project Title

Heat Risers

Project Reference Number

10061572

Project Licensee(s)

UK Power Networks

Project Start

Apr 2023

Project Duration

3 Months

Nominated Project Contact(s)

innovation@ukpowernetworks.co.uk

Project Budget

£123,080.00

Funding Mechanism

SIF Discovery - Round 2

SIF Funding

£92,341.00

Strategy Theme

Net zero and the energy system transition

Challenge Area

Accelerating decarbonisation of major energy demands.

Lead Sector

Electricity Distribution

Other Related Sectors

Gas Distribution

Funding Licensees

Lead Funding Licensee

UKPN - London Power Networks Plc

Collaborating Networks

UK Power Networks

Technology Areas

Commercial, Demand Response, Heat Pumps

Equality, Diversity And InclusionSurvey

Yes

Project Summary

Decarbonising heat in homes is one of the hard problems of Net Zero, and all customers must have access to credible options to decarbonise which are fair and affordable. MoBs, ranging from social housing and blocks of flats to Victorian terraces, are one of the hard-to-reach sectors.

The most common solution currently is the use of electric boilers or heat pumps, which for private/rental properties are marketed directly to the owner for installation in single residences, when a whole-building solution could have a lower energy demand per household and therefore accelerate connections and reduce costs for the energy system and consumer.

This project, therefore, targets Challenge 4: Accelerating the decarbonisation of major energy demands by (a) developing approaches to integrate heat solutions for MoBs to reduce network impact, delays and disruption; and (b) enabling the use of solutions that improve network efficiencies for heat decarbonisation pathways. The proposal also supports Challenge 1 by enabling the decarbonisation of heat for consumers which may have reduced opportunities for decarbonisation.

The energy network innovation involved in this proposal includes the design of novel network incentives, connection products, and/or services, that favour the uptake of whole-building solutions. The key outcomes of the project will be to ensure network constraints are less likely to prohibit residents of MoBs from uptake of heat solutions and to enable a reduced price point for customers in MoBs. These two factors should ensure that fewer customers are excluded from participating in a competitive market for heat solutions in the near-term.

The Discovery Phase will be delivered through the collaboration of the following partners:

- UK Power Networks: as the DNO providing project oversight and key input to the current upgrades process, avoided network costs and service/incentive design;
- DG Cities and RB Greenwich: as the local government representatives providing insight from prior projects into MoB archetypes and applicable heat solutions, customer segments, stakeholders, and route to market challenges;
- Passiv UK: as a technical consultant to provide input regarding the breadth of whole-building solutions in the market; and
- Baringa: as the project design and delivery lead utilising their commercial and market expertise.

If successful, this project will deliver value to:

- End consumers: ensuring fairness and progress in heat decarbonisation;
- Building operators: identifying a clear route to decarbonise their building heat; and
- DNOs (and their customers): minimise the number of connection requests and ensure that strategic solutions with lower network impact are selected

Project Description

Decarbonising heat in homes is one of the more challenging problems of Net Zero, and we need to ensure all customers are offered a credible option which is fair and affordable. Multi-occupancy buildings (MoBs), ranging from social housing and blocks of flats to Victorian terraces, are one of the hard-to-reach sectors.

The most common solution currently is the use of heat pumps or electric boilers, which for private/rental properties are marketed directly to the owner for installation in single residences, when a whole-building solution could have a lower energy demand per customer and therefore reduce costs for the energy system and consumer.

This piecemeal roll-out of heat pumps often leads to multiple assessments and site visits for the Distribution Network Operator (DNO) and a fairness issue for customers when the external or internal building network becomes constrained, and upgrades are needed before the next customers can install heat pumps leading to long delays.

However, the accountabilities and route to market for retrofitting MoBs are complex, with multiple ownership structures and responsible entities (e.g. owner occupied, private rental, housing associations, managing agencies, building owners) and a need to coordinate a buying decision with multiple customers. In many customer/building scenarios it is not clear who should be buying these solutions, and who is incentivised to try to sell them in favour of individual heat pumps.

This project will explore the potential to accelerate the decarbonisation of MoBs and reduce costs using whole-building solutions by:

- Proving the case for whole building solutions, their role within the context of BEIS' Heat & Buildings Strategy and clarifying the supply chain ecosystem (in particular for the benefit of planners/buyers on behalf of social housing and housing associations);
- Investigating the blockers to marketing and deployment of whole building solutions in the private/rental housing sector and working with market participants and investors to stimulate the development of propositions and sustainable business models -- including consideration of DNO services and/or incentives based on reduced energy system costs; and,

- Considering the tension between customer choice and the cost/pace of decarbonisation to deliver Net Zero goals.

Innovation is needed in this segment to address a potential market failure in which an opportunity to reduce costs for all and accelerate decarbonisation may be missed. If successful in demonstrating the business models required to deliver solutions for MoBs this project could unlock a new focus for investment in this hard-to-reach customer segment.

Third Party Collaborators

baringa

Royal Borough of Greenwich

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Project Description And Benefits

Applicants Location (not scored)

UK Power Networks:

Newington House, 237 Southwark Bridge Road, London, SE1 6NP

Baringa Partners LLP (OC303471):

62 Buckingham Gate, London, England, SW1E 6AJ

Royal Borough of Greenwich:

The Woolwich Centre, 35 Wellington Street, Woolwich, SE18 6HQ

DG Cities (09765525):

Bank Chambers, 1 Central Avenue, Sittingbourne, Kent, England, ME10 4AE

Passiv UK (12929432):

Synergy House Windmill Avenue, Woolpit, Bury St. Edmunds, England, IP30 9UP

Project Short Description (not scored)

Heat Risers aims to accelerate the decarbonisation of multi-occupancy buildings and reduce costs for all using whole building solutions -- working with market participants, investors, and stakeholders to develop viable routes to market, and investigate the incentives and funding mechanisms required.

Video description

https://www.youtube.com/watch?v=k1PLkt7YX-w&list=PLrMOhOrmeR6ldr-EVoT8ABGhTCxgyBKqs&index=49

Innovation justification

The common solution for decarbonising heat in homes, heat pumps, is marketed directly to the consumer for installation in single residences. In MoBs this often results in the installation of multiple solutions, which can lead to a constraint in the external or internal building network, impeding further customers' installations. Delays are often experienced due to unclear roles and responsibilities for upgrading the internal building networks.

The accountabilities and route to market for retrofitting MoBs are also complex, with multiple ownership structures and responsible entities (e.g. owner occupied, private rental, housing associations, managing agencies, etc.) and a need to coordinate buying decisions with multiple customers at the same time. In many customer/building scenarios it's not clear who should be buying these solutions, and who is incentivised to try to sell them in favour of heat pumps.

In addition, in the event of gas outages in multi-occupancy buildings, GDNs are often unable to repair gas solutions due to the outdated nature of the buildings. This has led to customers being off supply, fines, and a requirement for mitigation funds for GDNs (a further incentive for proactive retrofits).

BEIS' Heat and Buildings Strategy and UK Power Networks' Right to Heat project have developed insight into the customer landscape and buildings archetypes to be addressed through the roll-out of heat technologies. This project aims to build on this body of work by generating further insight regarding how MoB customers may be left behind by the status quo, the range of solutions that could address these segments, and the potential savings these solutions could deliver to all parties.

This is complementary to our accompanying Watt Heat SIF project proposal, which will generate insight into how solution adoption can be accelerated in smaller buildings.

The accelerated roll-out of MoB heat decarbonisation solutions will contribute towards Net Zero targets, as well as lower costs to the

energy system and consumers. It will also increase the fairness of the roll-out of heat solutions to consumers who could otherwise be left behind.

This customer/building solution encompasses technological and commercial complexities that make the commercial returns of such projects risky for private investors. We, as the DNO, are unable to commit our allowances to this project given future cost savings are unproven. A demonstration of the solutions and business models would enable all parties to pursue such solutions in BAU and would exceed the size of an NIA demonstration project.

Benefits Part 1

Environmental - carbon reduction – indirect CO2 savings per annum against a business-as-usual counterfactual
Financial - cost savings per annum on energy bills for consumers
Financial - future reductions in the cost of operating the network
New to market – products, processes, and services

Benefits Part 2

Our expectations of the benefits from increased flexibility from heat rest on an assumption that the energy market will return to a pre-crisis mode, in which consumers are exposed to variable energy prices depending on the time of use of demand.

Financial -- Future reduction in the cost of operating the network

The benefits can be tracked using the following KPIs:

- (K1) -- Average avoided cost to the DNO of whole building solutions compared to multiple single residence solutions

Financial - cost savings per annum on energy bills for consumers

There are 1.3 million purpose-built flats in London, and the running costs of whole-building heat solutions can be 40% less than isolated air source heat pumps -- driving the following benefits:

- (K2) -- Average cost of whole building heat solution installation and running costs per customer compared to multiple single residence solutions
- (K3) -- The number of whole-building solutions adopted over time

Environmental - carbon reduction -- indirect CO2 savings per annum against a business-as-usual counterfactual

The benefits can be tracked using the following KPIs:

- (K4) -- Uptake of heat solutions (number of households) in UK Power Networks' areas compared to DFES assumptions
- (K5) -- The number of whole-building solutions adopted over time

New to market -- products, processes, and services

These benefits can be tracked through the:

- (K6) -- Number of DNO services, connections products, and incentives available for whole-building solutions
- (K7) -- Installer/developer satisfaction with UK Power Networks' connections services for heat solutions
- (K8) -- Number of mainstream providers and propositions available for whole-building solutions

We will identify and evidence high-level assumptions for KPI 1 and 2 and forecast 3 - 6 during the Discovery Phase; validate these in more detail through Alpha Phase; and demonstrate them in Beta Phase. KPI 7 and 8 will be tracked over time post-Beta Phase.

Project Plans And Milestones

Project Plan and Milestones

The purpose of the Discovery Phase is to develop insight into the customer segments, needs, solutions and benefits available from promoting whole-building solutions in MoBs, and to inform a selection of propositions for development.

Six work packages (WPs) are proposed in the Discovery Phase:

- **WP1: Project Management (UKPN), £6,857**
Managing the delivery of the Discovery Phase;
- **WP2: Stakeholder engagement (Baringa and DG Cities), £17,007**
Informing the insight elements of the project through engagement with stakeholders, e.g. customer representatives, housing stakeholders, the GLA, heat technology providers, installers, investors and service providers;
- **WP3: Customer and building insight (Baringa), £25,649**
Defining and quantifying the customer and building segments for potential propositions, and informing the challenges, needs, and route-to-market for each segment;
- **WP4: Solution and ecosystem insight (Baringa), £13,642**
Identifying potential market scenarios for each of the customer/building segments, and informing the range of solutions available, and challenges that need to be overcome to enable a route to market for whole-building solutions;
- **WP5: Conceptual solutions and outline CBA (Baringa), £26,646**
Quantifying the counterfactual scenario of a roll-out of the prevailing heat pump technology for individual homes, and stress-testing the potential value of propositions for whole-building solutions; and
- **WP6: Assessment of barriers and enablers (Baringa), £2,540**
Assessing the key barriers to overcome and enablers needed to make the proposed solutions successful in the Alpha/Beta phases and beyond.

Our key risks in the Discovery relate to the ability to gain sufficient insight to clarify and answer the strategic questions. Our mitigation strategy is through the breadth of knowledge of the engaged project partners and stakeholders.

The key risks and mitigation strategies for this project are set out in the risk register, and constraints are discussed in Question 10. We will manage risks and issues using a RAID log, refreshed for weekly project meetings. Examples include:

- If we cannot get access to the right data or if insufficient real-world data regarding the potential solutions exists, we may not be able to develop confidence in the Cost/Benefit assessment of feasibility
- If we fail to identify and leverage all existing insight and build on prior work, we may not add as much new insight to help drive the industry forward
- If we are unable to generate a sufficiently reliable dataset from trials and demonstrations, we may not provide enough confidence for the market/industry to invest and change ways of working

Regulatory Barriers (not scored)

At this stage we are not aware of any specific derogations that would be required to proceed with a demonstration or trial of the technologies within the scope of this proposal.

A number of regulatory enablers may need to be established to enable an accelerated delivery of whole-building solutions in multi-occupancy buildings in the future -- e.g.

- **Clarifying unclear ownership of internal building networks and rising mains:** This ambiguity has been a longstanding issue. Whist this trial is unlikely to answer the question of ownership directly, it may provide some clarity around the impact of ownership ambiguity and the need to resolve the issue to enable improvements to be made.
- **Consumer choice vs centralised decision-making:** There is a potential tension in balancing customer choice with the need to drive faster and/or less disruptive solutions through more centralised solutions. This trial will highlight some of those tensions and provide evidence as to the balance of costs and benefits of the contrasting approaches.
- **Incentivising efficiency:** There is a need to develop appropriate incentive frameworks for permanent demand reduction and/or reduced connections burden. In particular, the opportunities to secure ongoing revenues associated with deploying more efficient technologies -- which have ongoing benefits for the network -- appears to be lacking.
- **Clarifying roles and responsibilities:** We anticipate that the accountability for decarbonising existing MoBs and the required timescales will not be well understood or consistent regionally. Policy and regulatory change may be required to clarify roles and responsibilities across the different customer segments.
- **Establishing funding and incentive arrangements:** A variety of approaches may be required for different housing segments.

This may include public sector funding, market mechanisms to share the benefits of energy system savings, and regulations to enable private finance to support delivery as part of a wider customer proposition.

These potential barriers and enablers will be assessed further during the Discovery Phase, and our intention is to inform future policy and regulation through the Alpha and Beta Phases by:

- Assessing the value case and urgency for better enabling delivery of whole-building solutions in multi-properties, thus informing the priority for policymakers and the way forward for local authorities;
- Working with market participants, investors, and stakeholders to develop proposed accountabilities, routes to market, and funding/incentives required to support viable propositions; and,
- Gathering evidence through real-world trials to understand customer acceptance and benefits.

Commercials

Route To Market

BAU adoption

To ensure solutions are adopted into business-as-usual (BAU) practices, we will work with the relevant UK Power Networks teams throughout design and testing. This will include network planners, to ensure insight regarding heat technologies can be adopted into planning policies, and the connections teams, to co-develop services and incentives to be offered to service providers. The relevant teams will be involved in trial and demonstration to ensure awareness of project outcomes and prepare uptake of practices in BAU.

Maintaining competitive markets

Any connections services and incentives developed through this project will be made available to all market participants, to maximise the uptake of heat solutions, and all data gathered and insights developed will be made freely available through project knowledge dissemination.

If successful, a key outcome of the project will be to ensure network constraints are less likely to prohibit residents of MoBs from uptake of heat solutions. The project will also seek to enable a reduced price point for customers in MoBs. These two factors should ensure that fewer customers are excluded from participating in a competitive market for heat solutions in the near-term.

Implementation

Within the DNO, new services and incentives will need to be implemented by the respective teams, such as the connections team, network planners or the DSO. Implementation of the MoB heat solutions will be the responsibility of active market participants, as of today.

Customer segments

The end-customers targeted by this project are residents of MoBs -- including owner-occupied, private rental, mixed occupancy and social housing. The specific segments to be targeted through any trial will be determined through research in the Discovery Phase.

Beneficiaries of improved DNO services and the insight generated will be the service providers (e.g. installers, suppliers) that will offer solutions to these customers.

Customer value proposition

The value proposed to consumers lies in better access to low-carbon heating technology at lower upfront costs, leading to lower energy bills. Whole-building solutions may also bring additional benefits of greater resilience to temporary supply outages.

Funding strategy

Once proven effective, new services and/or incentives to be provided by the DNO would be funded through BAU allowances, given the increased confidence in delivering a return for customers and shareholders. Roll-out of heating solutions to customers would be funded by customers themselves, or local authorities (in the case of social housing), as of today.

Intellectual property rights (not scored)

The parties agree to adopt the default IPR arrangements for this project as set out in Chapter 9 of the SIF Governance Framework.

The partners recognise that knowledge transfer is one of the key aims of the SIF and that the benefits of this project will be maximised by the ability of other licensees to be able to learn from the Project so as to create improved outcomes or reduce costs for consumers. The partners do not anticipate that the Discovery Phase (or any potential subsequent phases) will result in the creation of IPR that cannot be freely disseminated, and have no expectation of creating income streams or royalties from IPR outside of participation in a competitive marketplace for services that may be informed or stimulated via the outcomes of the project.

Costs and value for money

The estimated cost to deliver the HeatRisers Discovery Phase is £113,980. A combination of Project Partners will be providing benefits-in-kind to fund 23% contribution. Following these deductions, the SIF funding request is £92,341.

The breakdown across the project partners is:

UK Power Networks

Total estimated cost -- £19,640
Benefit in kind contribution -- £19,639
Total SIF funding request -- £1

Baringa Partners LLP

Total estimated cost -- £79,670
Benefit in kind contribution -- £1000
Total SIF funding request -- £78,670

DG Cities

Total estimated cost -- £7,145
Total SIF funding request -- £7,145

Passiv UK

Total estimated cost -- £4,275
Total SIF funding request -- £4,275

Royal Borough of Greenwich

Total estimated cost -- £3,250
Benefit in kind contribution -- £1000
Total SIF funding request -- £2,250

This project delivers value for money for three key reasons:

- It is targeted at delivering reduced costs for all through unlocking the benefits of adopting whole-building solutions in MoBs. The benefits are set out in more detail in the benefits section. If the Discovery concludes that this resource will not be valuable, the project can be stopped before Alpha. Without this project, the value of this resource will remain untested
- The project team has been specifically assembled with the required skills, prior knowledge, and existing stakeholder relationships to ensure that this project can be delivered, quickly, efficiently, and of high quality
- As the DNO, UK Power Networks will provide project oversight and provide key input on network impact and costs, understanding of the upgrade and connection process as well as service and incentive design
- Baringa Partners LLP devised the project idea and is a specialist energy-focussed management consultancy with long experience delivering innovation projects with GB DNOs. They are ideally suited to conducting this work and based on their specific expertise will be able to do so in an efficient manner and with confidence in successful delivery
- The Royal Borough of Greenwich is already focusing on multi-occupancy buildings with DG Cities, and this project can leverage the knowledge they have built up
- PassivUK is a technical heat systems consultancy suited to provide a broad perspective of whole-building solutions in the market
- The budgeted days and cost are based on deep experience amongst the team of running multiple similar scale projects. The partners are aware of the methodologies and tools they will follow and are confident an efficient cost has been proposed.

Document Upload

Documents Uploaded Where Applicable

Yes

Documents:

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SIF Round 2 Discovery - Heat Risers End of Phase (for upload) (1).pdf

SIF Round 2 Discovery - Heat Risers Show and Tell (for upload).pdf

This project has been approved by a senior member of staff

☑ Yes