SIF Alpha Round 2 Project Registration

Date of Submission

Project Reference Number

10061350

Initial Project Details

Project Title

Heatropolis

Project Contact

innovation@ukpowernetworks.co.uk

Challenge Area

Accelerating decarbonisation of major energy demands.

Strategy Theme

Flexibility and commercial evolution

Lead Sector

Electricity Distribution

Project Start Date

01/10/2023

Project Duration (Months)

6

Lead Funding Licensee

UKPN - London Power Networks Plc

Funding Mechanism

SIF Alpha - Round 2

Collaborating Networks

UK Power Networks

Technology Areas

Heat Pumps

Project Summary

The operation of low carbon heat networks is poised to transform the way we heat our homes and buildings as we embrace less reliance on fossil fuels for heating. Today there is a disconnect between DNO planning and heat network design. Left unmanaged, this will affect the planning and operation of the electricity network, and ultimately be costly for consumers.

Heatropolis is a ground-breaking multi-stage framework, set to unlock better outcomes between heat and electricity networks. Intelligent heat network design and operation will deliver significant flexibility and electrical load reduction to lessen the need for costly reinforcement by DNOs.

Add Preceding Project(s)

10061339 - Heatropolis

Add Third Party Collaborator(s)

Passiv UK

Metropolitan

Project Budget

£537,089.00

SIF Funding

£483,374.00

Project Approaches and Desired Outcomes

Problem statement

Heat-networks will play a central part in the decarbonisation of heat in buildings across the UK. The Climate Change Committee estimated that around 18% of UK heat could come from heat-networks by 2050, a rise from just 2% currently. The roadmap to achieve this vision, could attract £30-£50 billion investment into the UK, directly creating between 20,000 and 35,000 jobs*.

While most heat-networks currently rely on fossil-fuels, future connections will ultimately need to be carbon neutral. Independent analysis from DESNZ highlights that over 83%** of heat-networks will be powered by electricity and this will have major implications for DNOs. There are currently no commercial incentives for heat-networks to manage their electrical loads in line with capacity and constraints of the electricity network. Without appropriate commercial frameworks, there is a risk that reinforcement costs arising from the growth in un-managed electrical heat-network connections will be passed on to end-consumers.

During Discovery Phase, we appraised existing Net Zero plans for the Kings Cross heat-network. This is a major mixed-use urban heat-network serving a portfolio of commercial buildings (79%) and residential properties (21%). The site owner is driving the transition of the heat network from relying on fossil-fuelled CHPs that provide 1.5MW to the electricity system to heat-pumps and electric boilers with a peak electrical demand of 17MW. Heatropolis continues to address Challenge 4: Accelerating decarbonisation of major energy demands and will provide a valuable early opportunity to explore how smarter heat-network design and operations can also offer important benefits to DNO's.

We reviewed options for managing the site's electrical demand and identified demand flattening, and smarter thermal stores as the most promising solutions. We had originally planned to explore how smarter heat-networks could help to avoid reinforcement of the local substation on site and extrapolate these savings across UK Power Networks' area. However, ongoing growth on the development from non-heat-based building demands (e.g., data centres) means a significant over capacity will be installed. Our cost benefit analysis instead applied the peak load reduction from smarter heat network design solutions within existing DNO power model and planning tools.

Using outputs from UK Power Networks' Strategic Forecasting System (SFS) software, and data from our Distributed Future Energy Scenarios Network Scenario Headroom Report (DFES NSHR), we were able to understand how managing heat-networks electrical loads could be used to realise value from avoided reinforcement. This approach has helped us understand important limitations in the power-modelling tools and how they project emerging headroom constraints arising from an expansion of low carbon heat-networks. Addressing these assumptions will now form key part of our analysis in Alpha. We now also recognise that the planned over-capacity on the Kings Cross site will also create a safer technical sandbox environment for Beta Phase that will limit exposing the wider electricity network to operational risks.

Our cost benefit analysis clearly demonstrated the underlying value proposition for users of the Heatropolis framework (heat-network users, operators, DNO's and infrastructure investors). Heat-networks are designed to meet heat load for their end users and have no direct commercial motivation to minimise or profile their electrical loads based on the electricity network. The right commercial framework could achieve reductions in heat-network peak loads of 45% which could deliver around £40m in avoided reinforcement costs by 2050.

In Alpha, we intend to build on our Discovery findings to test technical requirements and validate commercial mechanisms needed to deliver the Heatropolis framework ahead of a large-scale sandbox-trial in Beta Phase.

*https://www.heatnic.uk]

**BEIS 2021 - Opportunity areas for district heating networks in the UK National Comprehensive Assessment of the potential for efficient heating and cooling

Innovation justification

Heatropolis is at the forefront of energy network innovation. We will bring together the latest advances in machine-learning controls, heat-network engineering, infrastructure simulations, power system planning and coordinate a diverse range of stakeholders to enable a whole-system transformation process.

Historically, asset management decisions and operational strategies for heat-networks and electricity networks have been delivered largely in isolation from each other. Heatropolis aims to address the problem of coordinating planning decisions between these large and interlinked infrastructures. Our focus is Challenge 4: Accelerating decarbonisation of major energy demands.

In Discovery, we explored technical designs to manage peak electrical loads from heat-networks and the value this offers the electricity network. By better understanding how heat-network power demands can be controlled and managed, new sequenced and consumer focused commercial frameworks can be

established that optimise outcomes for all parties.

The project offers a unique, strategic opportunity to explore advanced technical solutions and validate innovative business processes in the context of a live large-scale heat network that is transitioning to Net Zero. We will enable a sandbox environment to evaluate the impact of smart solutions, validate commercial mechanisms, test incentives and risks to all parties to develop viable new propositions linking a DNO and a heat-network operator.

There is a high level of uncertainty in the projected impact of heat-networks on the electricity network. The use of machine learning to manage peak electrical loads on heat-networks over the long-term and required user interactions is largely untested. There are risks in coordinating these interdependent processes and they have significant implications for investors and end users.

We will build on Discovery and focus on three core issues:

· Consumer needs -- understanding the interactions of smarter heat-network designs with end-user expectations and requirements.

· Technical requirements -- sandbox testing of smarter design engineering needed on low-carbon heat-networks to actively manage electrical loads that is beneficial to planning and operation of electricity networks.

· Commercial mechanisms -- a framework through which long-term agreements can be developed that enable long-term investments in heat-network infrastructure assets which are directly beneficial to DNOs.

Heatropolis will leverage the experience of previous innovation projects, including Passiv UK's SMOOTH research on demand flattening control systems in heat networks and NOTICE's proof-of-concept trial using machine learning to enhance operational efficiencies in a heat network.

The project will learn collaboratively from other SIF heat-network projects:

· Heat Risers: Improving efficiencies for heating in multi-occupancy buildings.

· Full Circle: Developing innovative solutions to recover heat from transformers.

SIF offers an appropriate platform to build and test an innovative and complex framework that would not otherwise be funded within the price control or considered as business-as-usual. Our ambition is that once Heatropolis has been demonstrated and proven in Beta, it will be ready to be adopted and scaled by heat-network developers and DNOs across the UK.

Readiness Levels have been summarised as follows:

· Technology readiness: Alpha will further validate commercial applications of the technology [4-6] and Beta will test and improve the technology for use in integrated investment planning [7-8]

· Integration readiness: Aim to validate detail and quality shared energy modelling by the end of Alpha [4] and application of Heatropolis as a technical sandbox in Beta prior to for BAU replication [7].

Commercial readiness: Alpha will develop map of business options and economic impact for all stakeholders [5]. Beta will validate financial model [7].

A review of processes and baseline assumptions was performed during Discovery for the Kings Cross heat network's phased decarbonisation plan (counterfactual), which includes heat recovery heat pumps, ground source heat pumps, and air source heat pumps with peaking and backup supply by electric boilers and thermal storage.

Impact and benefits (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – direct CO2 savings per annum

New to market – processes

Impacts and benefits description

Impacts and benefits description

Projecting the impact of the interactions between heat-networks and electricity distribution system is complex. To align our analysis with established BAU practices we used UK Power Networks' (UKPN's) planning datasets including outputs from our SFS software which forecasts load growth under different scenarios and our DFES projecting unused network capacity on their substations to 2050.

The peak loads from heat-networks used in the SFS baseline projections were central to our analysis. Our evaluation identified critical limitations to SFS modelling related to specific assumptions on flat intra-day load profiles, average connection loads and energy fuel-mix. These assumptions will be addressed through Alpha and Beta technical sandboxing and will likely increase measurable benefits.

Financial - future reductions in the cost of operating the network

· This project will help establish long term commercial agreements that reward heat-networks for managing peak electricity demands thereby avoiding unnecessary costs being passed on to consumers.

· Discovery suggests baseline costs for reinforcement across UKPN's area will be more than £1,000m by 2050.

· Overlaying electrical peak load reductions of 44% from smarter heat-networks we estimated over £35 million in avoided network reinforcement is achievable.

· Existing DNO connection processes serving a heat-network with unmanaged peak loads will lead to higher reinforcement costs being passed to customers.

Financial -- cost savings per annum for users of network services

· Peak electrical load flattening on the of the heat network will improve efficiency reduce losses and consumer power demands (heat charges).

· Smarter management of demands will enable better use of heat network capacity resulting in lower operational costs passed

on to consumers (standing charges).

· This benefit will be modelled during the Alpha Phase.

Revenues - improved access to revenues for users of network services

· Long term predictable revenue streams from load flattening, demand shifting, and flexibility will create the market pull for heat network asset owners to invest in the infrastructure necessary to provide this.

· This benefit will be modelled during the Alpha Phase.

Environmental - carbon reduction -- indirect CO2 savings per annum

· This project will help to improve cost efficiencies of deploying heat-networks.

· This will lead to a more rapid uptake of low carbon heating in domestic and commercial building, resulting in indirect carbon emissions reduction and air quality improvement from the shift away from fossil fuel-based systems.

· Increasing high volumes of flexibility from large heat-networks through smarter designs and incentives will help manage capacity constraints on the electricity network which can avoid CO2 emissions associated with grid reinforcement. An estimation of 1497 tonnes CO2 eq. can be avoided until 2050 if the option with higher peak demand reduction (option 4 in CBA) is adopted in all UKPN areas.

· Carbon savings between options from the heat-network will be modelled during the Alpha Phase.

New to market -- processes

· The creation of new to market commercial framework and operational processes to realise cost efficiencies through improved coordination of long-term energy infrastructure investments that will balance heat-network, DNO and consumer needs.

· Commercial options under consideration to be developed in Alpha Phase include:

· Pre-agreed energy performance-based contracting to deliver load reduction using metering and monitoring using data to validate contract delivery.

· Long term contractual mechanisms for metering and monitoring ongoing electrical loads with appropriate incentives and or penalties for achieving targeted profiles.

Overall the benefits case calculated for the Alpha Phase submission are conservative as described above, with some benefits to refined or calculated during Alpha Phase delivery.

Teams and resources

The Project Partners for Discovery Phase consisting of UKPN, Passiv UK and Metropolitan performed well and will form the same core partnership for Alpha Phase. Closer and more in-depth collaboration among the partners is expected in Alpha Phase for more detailed heat network end-user engagement, technical design evaluation and selection of commercial mechanisms to be tested.

UKPN is responsible for connecting heat-network energy centres containing large assets such as heat-pumps, electric-boilers to their network. Part of our commitment is to be the enablers of the decarbonisation of heat and the transition to Net Zero. UKPN's Innovation Team has led multiple large-scale network innovation projects focused on the decarbonisation of heat. Work on this project will be supported by our DSO and connections teams who design, undertake and monitor new and altered electricity supply connections.

Passiv UK has established a strong track record of delivering high-quality applied research and innovation projects including heat-network optimisation and multi energy asset control integration solutions. Passiv's in-house product development teams include specialist consultants and data scientists who have the knowledge base and skills necessary to drive forward the innovations required to deliver much of this work internally and with the Project Partners. To support the installation of a proof-of-concept smart control system during Alpha, Passiv will be working with established specialists and subcontractors procured at the beginning of Alpha who will also support with consumer and key stakeholder engagement workshops to ensure alignment between parties.

Metropolitan, is a leading UK-based provider of turnkey heat networks services whose capabilities cover end-to-end utilities infrastructure solutions from initial design through to live network operation. These services are delivered either individually or as part of complete multi-utility packages including district heat, electricity, water, wastewater, and gigabit fibre. Metropolitan has built a team of leading experts from the district energy industry who have contracted multiple ESCo contracts across the UK and are responsible for constructing, adopting, and operating a thermal generation plant, supplying over 50,000 homes and over 250,000m² of commercial buildings.

Metropolitan will provide design engineering expertise to optimise heat network design to manage electrical loads and commercial insight to develop and deliver robust business plans for long term operational investments. The following subcontractors will be procured as part of a competitive process at the beginning of Alpha Phase:

Specialist Techno-Economic Consultancy

· Update power system model to revise baseline heat network assumptions.

· Commercial design -- defining business processes, value flows, data exchanges and key stakeholder requirements.

· Business model design -- techno-economic appraisal of impacts to all stakeholders (heat network operator, investors, asset owners, end uses and DNO).

· Recommendations for Beta testing -- including stakeholder engagement to ensure alignment.

Design engineering consultancy

· Evaluation of shortlisted design options (electrical, mechanical, and peak load backup).

· Techno-economic appraisal of each design option for heat network operator and end uses for wider business model.

· Development of detailed technical design tender documentation for Beta sandbox.

Building control system installers

· Installation of control systems for Alpha proof-of-concept trial.

Project Plans and Milestones

Project management and delivery

Approach to Project management

Passiv will lead project management, using well-established methodologies refined over many innovation projects. Successful delivery will be ensured through implementation of best-practice planning, governance, and effective reporting.

The project will follow clearly defined task-based responsibilities and outputs tracked to dependent task-inputs. Management reporting lines will start with responsible individuals (task-leads) reporting to work package leads via task management templates. Work package leads report to the Project Manager adding synopsis, Red-Amber-Green (RAG) risk assessments of their work package, which the core team review regularly. The Project Manager will highlight omissions, risks, mitigations, overall critical path, timekeeping, and update UKRI on progress.

The focus for Alpha Phase is on three issues central to the Heatropolis framework:

· Consumer needs -- heat network end users' interaction with smarter design options

· Technical requirements -- engineering resources needed for smarter heat-networks.

· Commercial mechanisms -- development and validation of technoeconomic modelling needed to enable investment in more efficiently managed infrastructure systems.

Risk management strategy

The overall risk management and escalation strategy for the project will be overseen by a Steering Group. Each member of the project partnership will provide a representative to the Steering Group who will meet monthly to address project strategy, high-level financial issues progress, work dependencies, risks issues and plan for the following month. The focus will be on key risks and issues rather than activities on track. There will also be weekly Project Delivery meetings including members of the wider project team to manage general progress on project deliverables. Additional team members will be invited to project meetings as and when required.

Key risks

Some of key risks to the successful delivery of Alpha Phases and mitigation approaches have been identified below. An in-depth risk assessment will be carried out at project inception and updated throughout the delivery phase:

· Complexity: Implementation of proposed framework is not achievable to desired specification. Mitigation: Manage co-development of the solution

· through a joint scoping phase with highly experienced teams.

· Resource: Loss of key staff or failure of partners to commit resources as agreed. Mitigation: Careful project planning and robust resource management including an agreement that ties task delivery to payment.

· Delays: Global supply chain availability for smart control equipment leads to slippage of project deliverables. Mitigation: Ensure products are ordered with enough time to allow for delays and where possible create supplier contracts reserving critical stock.

A more detailed risk log is included in the Project Management Book.

Project plan and outputs

The Alpha Phase will be split into five work packages. The tasks and timescales are given in the Project Management Book and Gantt.

Stage gates

- Collaboration agreements signed by all parties.
- Installation of smart control equipment approved by Metropolitan heat network stakeholders.
- Heat network design options for Beta agreed by all parties.

Dependencies

- Power model outputs are needed to develop whole system techno-economic evaluation.
- Data from smart control installations is needed to validate heat network modelling protocols.
- Validation of commercial framework requires outputs from both heat network and power modelling.

Additional Considerations

Much of the physical work installing smart control systems or monitoring and metering equipment will be non-invasive so there are no expected interruptions to supplies or how customers access energy services.

Key outputs and dissemination

Heatropolis aims to create a unique commercial framework that encourages longterm infrastructure investments, generating outputs that support the decarbonisation of building heat and cost-effective management of major energy demands on the electricity network.

The Alpha Phase will be delivered through five work packages and produce the following key outputs with respective responsibilities:

- WP1 Project Management - Project delivered to plan.
- WP2-Smart Control Testing: Installation, testing of smart control on sample buildings to validate heat network modelling simulations. Responsible: Passiv, accountable: Metropolitan
- WP3-Technical Design for Interventions: Techno-economic evaluation of design options and development of procurement documentation for Beta trail. Responsible: Metropolitan, accountable: Metropolitan
- WP4- Commercial and operational framework: Revise power model projections and benefits case for DNO. Integrated techno-economic CBA for all stakeholders and a regulations options assessment, development of business case and recommendations to be tested in Beta. Responsible: Passiv UK, accountable: UKPN
- WP5-Dissemination and Planning for Beta: Stakeholder engagement, dissemination and planning for beta testing of commercial frameworks, and technical sandbox trials of in-situ smart-control systems and monitoring within a real site and at sufficient scale to enable replicability of approach. Responsible: Passiv UK, accountable: UKPN

Learning and knowledge dissemination will be key success criteria for this project. Heatropolis will help to establish a valuable evidence base of how low-carbon heat network infrastructures interact with the power system to enable a more costefficient decarbonisation of heat for end-users. These outputs will be valuable for multiple stakeholders such as DNOs, heat networks designers, operators, policymakers, technology providers, investors and customers who all have a stake in decarbonising the power system in a cost-efficient manner.

Our project has been planned and structured to ensure that our learning opportunities are maximised through an agile and iterative approach. This approach will enable lessons to be shared with partners quickly and adopted in later phases of the project and trials to support a process of continuous improvement and convergence to a BaU solution that is ready for large-scale commercialisation. It is our intention to ensure that reliable information is provided to all stakeholders when disseminating the challenges and learning of delivering this project. Our dissemination activities will provide clear and consistent messaging and will use a range of communication channels to maximise effectiveness.

As part of the Alpha project set-up, Passiv will develop an expanded dissemination plan including identifying appropriate communication channels for different groups of external stakeholders and the information that will need to be shared with them.

This will ensure the right information reaches each target audience. Each of the following key communication channels will be led by individual project partners:

· Websites: promote the activities of the project through partners own websites (Passiv). All Alpha Stage projects will be uploaded to the Smarter Networks

· Portal and feature on the UKPN innovation website with specific project learnings being disseminated at the IUK Show & Tell events.

· Social Media: utilise social media techniques to increase visibility and grow the profile of the project by targeted interaction with other users (Passiv). UKPN will look to share project successes and discoveries via its social media channels with the possibility of publishing external media where appropriate.

· Dissemination Events: UKPN will host an in-person event in London to disseminate the learnings and key outputs of all our SIF projects to a wider audience.

· Newsletters: We will provide an end-of-phase case study to support knowledge transfer of the solution to stakeholders (Metropolitan)

We will coordinate our dissemination efforts with other SIF projects focused on heat networks to optimise resource utilisation and showcase collaboration.

Commercials

Intellectual property rights, procurement and contracting (not scored)

We recognise the importance of managing IPR in the delivery of a research and innovation project. All the project partners intend to comply with the default arrangements for IPR and Chapter 9 SIF Governance Document.

The activity for the Heatropolis Alpha Phase will include a proof-of-concept trial, design and technical evaluation that explores how different low carbon heat network assets and innovative control systems can use novel commercial arrangements to deliver operational system benefits.

Prior to starting the Alpha Phase, each project partner will make a declaration of background IP for the consortium agreement that will clearly define the background IP they bring to the project and any deviation from the default arrangements already highlighted to UKRI. Any additional specific IP issues arising during project delivery will be addressed by the project Steering Group as required.

An IP Register will be created at the beginning of the Alpha set-up phase as part of contracting and will be developed and maintained throughout the project. Any restrictions on freedom to operate from individual components or know-how used in Heatropolis will be evaluated as part of the project delivery.

To develop the business case for the commercial framework we intend to appoint a specialist Economic Consultancy as a subcontractor. Passiv will carry out a procurement process at the beginning of Alpha to ensure best value in line with the agreed budget.

Commercialisation, route to market and business as usual

Heatropolis will provide a technical sandbox and commercial framework through which multiple stakeholders including electricity networks and heat-network operators can test solutions and coordinate investments to deliver a more costefficient energy infrastructure.

Passiv and Metropolitan have significant routes to market in the new-build and heat-network sector through the wider BUUK Infrastructure group (their parent organisation) which already provides over three million utility connections in the UK. The level of heat-network investment and smart control expertise offered, make them best placed to implement the commercial innovations demonstrated through this project. Core target markets are housing developers, local authorities, and heat-network infrastructure investors.

The Project Partners are all part of well-established, global groups of companies, with proven expertise in owning and operating major infrastructure projects that require long-term investment planning and bring a high level of commercial readiness to the project. If the commercial framework can be agreed during the project between all parties, no additional investment requirements would be needed to support deployment at scale. Once proven effective, new services and/or process to be provided by the DNO/DSO would be funded through BaU allowances.

The route to market and business as usual for each of the partners is as follows:

· UKPN: A new long-term commercial (connection/flexibility) process for heat-networks to manage their projected peak electrical loads in a more flexible way.

· Metropolitan: Design and operation services that can be deployed within a large portfolio of existing and planned large-scale low carbon-heat-network projects. The heat-network would be incentivised through the new commercial process to cover the upfront costs of any improvements, including equipment installation and operational enhancements.

· Passiv: Provider of turnkey, machine-learning smart control software services for heat network operators to shape energy demands and identify new revenue opportunities.

As we transition away from fossil-fuels, decisions made by heat-networks will have an increasing impact on electricity networks. Although structurally interlinked, they have limited opportunities for coordinating long term investments. To avoid costs from upstream reinforcement and capacity constraints being passed on to consumers, low carbon heat-networks must become more

actively integrated within the operations of a smarter and more flexible electricity distribution system. Our cost benefit analysis for Discovery Phase clearly demonstrated the underlying value proposition for Heatropolis.

The analysis in Discovery Phase has not yet considered the detail of the commercial agreements that would be used to realise the Heatropolis framework, this will be a key part of the Alpha Phase.

Heatropolis is committed to not undermining the development of competitive markets or prevent the use of existing DSO flexibility products within an area. Rather, it is envisioned that the long-term contractual mechanisms developed through this project will operate and be stacked alongside a range of competitive services and regulated markets as part of a wider more flexible whole energy system. Regardless of the financial instruments that are ultimately established, the Heatropolis framework will need to ensure fair competition, non-discrimination, and transparent operation of the network.

Heatropolis capitalises on a market failure to encourage smarter heat-network designs that manage their electrical loads more efficiently. The framework that will be developed through this project will detail the commercial arrangements, financing mechanisms, and business cases needed to incentivise heat-network operators to manage their peak electrical loads in a way that benefits the DNO that is supporting them. All findings, services and incentives developed will be made available to all market participants to accelerate adoption as part of BAU.

Policy, standards and regulations (not scored)

Policy, standards and regulations

There may be some regulatory barriers for fully embedding our expected project outcomes into BAU contracting, as a new contractual mechanism might be created.

As part of the Alpha Phase, we will explore any opportunities for modifications to regulations, in collaboration with UKPN regulation team, that could enhance the benefits of our innovation and provide an assessment of how achievable these changes would need to be. The output of this engagement will be included in deliverable 5.4 - Report summary on barriers and enablers for Beta Phase trial.

If required, we would also engage with Ofgem to understand the options for any regulatory and governance-based arrangements that may be needed in the Heatropolis framework between heat network and DNOs.

All learnings across the phases will be developed and shared with relevant stakeholders to support mitigation strategies for any identified barriers when the framework is applied to either new or existing heat network infrastructure sites.

Value for money

The total cost of the Alpha Phase will be £537,089 with a total SIF-funding request of £483,374. The Project Partners are contributing 10.00% of the total project costs. This demonstrates a commitment to the project from partners as well as value for money to customers.

UK Power Networks:

- Total costs: £49,800
- Total contribution: £4,980 (10%) contribution labour in-kind

· SIF-funding: £44,820

Metropolitan:

· Total costs: £142,200

· Total contribution: £14,220 (10%) contribution labour in-kind

· SIF-funding: £127,980

Passiv UK:

· Total costs: £345,089

· Total contribution: ££34,515 (10%) contribution across all categories in-kind

· SIF-funding: £310,574

The approach tested through Heatropolis could reduce peak electrical demands by up to 44%, potentially enabling £35m savings until 2050 from avoided reinforcement and consequentially savings passed to end consumers which will not be realised unless this project is funded.

Any key learnings including framework established will be disseminated to key stakeholders such as DNOs and heat-network operators across the country. The Project Partners' expertise allows them to efficiently deploy their knowledge, contributing resources at competitive market rates, resulting in good value for money.

Both Passiv and Metropolitan recognise the commercial importance and potential of the project and will contribute 10% in kind from commercial revenues. These contributions will be through their own labour rates as well as for materials and subcontractor costs. Working with project leads at UKPN, Passiv will be responsible for managing a subcontractor delivering the business models and contractual mechanisms needed to realise the whole system cost efficiencies of using smarter designs and operational processes. Subcontractor costs are based on market engagement and are estimated to maximum budget of £100,000. A procurement process will be carried out to ensure best value with any shortfall, subject to pre-defined limitations, covered by Passiv.

Heatropolis offers a valuable early opportunity to actively engage with and inform the detailed design and operational development of a large-scale low-carbon heat-network. The project will benefit from the use of existing multimillion pound infrastructure on the Kings Cross site as well as ongoing planning and investments to transitioning the energy centre away from carbon-intensive CHP systems over to low-emission electric heat pumps and thermal storage.

Passiv UK will be leveraging significant value for this project through prior knowledge and IP in the field of smart control systems on heat-networks. They will be building on outputs from previous innovation projects including SMOOTH which carried out applied research into the use of demand flattening control and NOTICE, delivering a proof-of-concept trial using machine learning to enhance operational efficiencies in a heat-network.

UKPN requires the lowest share of costs and SIF-funding and the biggest added value is to provide strategic support to Passiv in the development of the framework between DNO and heat-networks. This strategic support includes oversight and key technical engagement with Network Planning, Connections, DSO (Flexibility) and Regulation Teams.

Without the SIF, innovations realised through this project would not go ahead in their current form. The trialling of commercial frameworks and technical sandbox testing could not be achieved independently. This would result in continuation of siloed infrastructure development and less cost-efficient transition to Net-Zero for energy consumers.

The new commercial framework that is being established through this project will help coordinate investment in long term smart heat network assets as part of a phased transition to a smarter energy system infrastructure.

Associated Innovation Projects

- ○ Yes (Please remember to upload all required documentation)
- ◉ No

Supporting documents

File Upload

Heatropolis_R2 Show and Tell_24 April 2024.pdf - 1.7 MB
Heatropolis_End of Phase_April 2024 for ENA.pdf - 2.7 MB
Heatropolis_UKRI Mid Point Meeting_Jan 24_For Upload.pdf - 1.7 MB
SIF Alpha Round 2 Project Registration 2024-01-25 9_38 - 81.5 KB

Documents uploaded where applicable?

☑