SIF Beta Round 2 Project Registration

Date of Submission

Jan 2025

Project Reference Number

10127935

Initial Project Details

Project Title

SHIELD - Smart Heat and Intelligent Energy in Low-Income Districts

Project Contact

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Challenge Area

Supporting a just energy transition

Strategy Theme

Consumer vulnerability

Lead Sector

Electricity Distribution

Project Start Date

01/12/2024

Project Duration (Months)

49

Lead Funding Licensee

UKPN - Eastern Power Networks Plc

Funding Mechanism

SIF Beta - Round 2

Collaborating Networks

Electricity North West

Technology Areas

Heat Pumps

Carbon Emission Reduction Technologies

Low Carbon Generation

Distributed Generation

Photovoltaics

Poverty

Energy Storage

Project Summary

SHIELD is a bold new initiative aimed at making the Net Zero transition accessible to low-income residents of social housing and other tenures who cannot afford Low Carbon Technologies (LCTs). SHIELD utilises innovative solutions, including distributed data centres for heating, PV and battery storage to intelligently balance supply and demand.
This innovative approach to decarbonisation seeks to address the debilitating issues faced by those who live in fuel poverty, helping to reduce both the upfront and running costs of consumers' heating and energy. SHIELD provides a path to decarbonisation for all, which would otherwise be out of reach.

Add Preceding Project(s)

10061386 - SHIELD - Smart Heat and Intelligent Energy in Low-Income Districts

10061387 - SHIELD - Smart Heat and Intelligent Energy in Low-Income Districts

Project Budget

£9,887,287.00

SIF Funding

£5,401,332.00

Project Approaches and Desired Outcomes

Solution statement and solution focus

The current approach to decarbonising heat and energy in consumers' homes is not inclusive of vulnerable and low-income households. The upfront and running costs of these solutions are too high for many to afford.
Fuel poverty is a growing issue in the UK:
NEA estimates six million UK households currently experiencing fuel poverty
DESNZ estimates households need an average reduction of £417 in fuel costs to escape fuel poverty, an increase of 20% since 2022
Essex County Council research showed at least 7.6% of households in Essex were fuel poor, rising to 17% in a worse-case scenario
Retrofitting homes can reduce fuel poverty and support Net Zero goals but is often:
Expensive – Estimated costs £20,000-£60,000 per home
Complicated – Reliant upon finite grant funding schemes, or for self-funded retrofits the supply chain is hard to navigate and doesn't encourage use of the latest technologies (e.g. heat pumps)
Happening too slowly – Of 792,705 homes in Essex, just 547 low-income homes were retrofitted in 2022-2023
During Discovery and Alpha, low-income social housing tenants expressed concern about energy costs. Investigation showed the bottom 80% of households by income have just £12,557 average liquid capital so cannot afford the upfront costs of decarbonising their homes. As a result:
Many social housing tenants underheat their homes to only 10 – 15 degrees in winter (Power Circle Projects (PCP) survey, 2023)
42% of households with prepayment meters ran out of credit and sought support (Discovery survey, 2023)
It has become clear that fully-funded 'Pay as You Use' business models are critical to delivering Net Zero and ensuring a just transition.
SHIELD provides a solutions, addressing Challenge 1, and more specifically Theme 2, by supporting decarbonisation of heat for fuel poor groups and those with reduced access to opportunities. This is achieved by implementing an innovative Social ESCo (Energy Services Company) model, providing the following LCTs at zero upfront cost:
PV and battery storage for low-cost electricity
Thermify HeatHub units which capture waste heat from data processing for low-cost domestic heating
The ESCo delivers this by selling both unused generated electricity and grid services, such as flexibility, to fund the capital required.
During Alpha, we:
Validated the Social ESCo service delivery (energy & financial modelling)
Developed detailed technical design for a residential heating system using Thermify HeatHubs
Developed a commercial model for the ESCo (contracts now in use)
Identified social and private housing tenants willing to participate in Beta
Developed a robust and de-risked rollout plan for Beta, incorporating findings from Alpha
Target users for SHIELD include any household needing low-carbon heat and power, subject to space constraints. Low income and vulnerable households are a target group and the focus in Beta. The Social ESCo innovation is suited for social and private landlords, as well as low-income homeowners. SHIELD addresses users' needs by substantially reducing energy costs (20-40+%) and carbon emissions (90+%), as shown by tenant's current home energy performance and modelling SHIELD's outputs.
SHIELD adoption is promising, as out of the 500 social housing residents interviewed in Essex, a significant majority were concerned about energy costs and climate change, with 68.3% willing to immediately try the SHIELD system. Key concerns raised that helped to shape the scope for Beta were:
Changes to comfort levels at home
Challenges in learning to use the system
Maintenance plans and support
Additionally, SHIELD partners are engaged in Phase 2 of the Essex Net Zero Taskforce project, which includes engagement with institutional funders on net zero project finance. Several other UKPN led SIF projects are relevant and will collaborate to share learnings and enhance SHIELD's development.

Innovation justification

SHIELD encompasses two main innovations:

Developing a not-for-profit Social ESCo which will not only focus on conventional district heat network solutions, but also provide grid services and support individual domestic LCTs. The ESCo aggregates decarbonisation opportunities and secures funding to install and operate these low-carbon energy systems on behalf of landlords and homeowners.
Integrating Thermify's Heathub into domestic heat and power systems. The HeatHub recovers waste heat from decentralised data processing for business customers, providing affordable heat. It adjusts its processing activities based on the home's heat demands and provides a 70% carbon reduction compared to hyperscale data centres due to reduced electricity requirements. Currently, Thermify's products are at TRL7 and CRL7 but are expected to reach TRL9 and CRL8 by end of Beta.
The HeatHub integrates with other LCTs in Smart Local Energy Systems (SLES), balancing home energy generation and use, and providing flexibility services to the grid. The HeatHub is at IRL5 and is expected to reach IRL7 prior to Beta installations.

Successful development of these innovations will:
Reduce energy costs for fuel-poor households
Enable access to institutional capital to scale-up deployment
Speed up decarbonisation for fuel-poor households
SHIELD addresses Challenge 1 by:
Supplying fuel-poor households with low-cost heat and power whilst reducing carbon emissions
Developing a Social ESCo to provide SHIELD at no upfront cost, making it accessible to households of all incomes
To ensure electricity demands beyond SHIELD's generation are also low-carbon and low-cost, SHIELD has partnered with UrbanChain, who provide green energy via a Peer to Peer (P2P) network. UrbanChain use AI and blockchain technology to intelligently match low-carbon electricity generation with consumer demand half-hourly.
In addition, SHIELD will apply learnings from related SIF projects, including Net Zero Terrace and RetroMeter, which highlighted opportunities to complement current technology choices and explore options to monetise carbon savings. Additionally, the UKPN Heat Risers project is addressing challenges with energy solutions in multiple occupancy buildings (MOBs). MOBs have not yet been targeted, however by taking learnings from Heat Risers, SHIELD aims to investigate rolling out in a block of flats during Beta.
Stakeholder engagement has been essential in Beta planning. Examples of input received include:
Tenants – concerns about potential drawbacks of SHIELD and challenges in learning to use the system
Housing Associations – questions regarding the installation and end-of-life of the technologies and planned tenant engagement
Citizens Advice (CAB) – best practice advice on communication approaches with fuel-poor tenants
For Beta, PV and battery technology will be installed in 300 homes, with 100 utilising the HeatHub solution. This will qualify SHIELD for both DSO and ESO grid services requiring 1MW+ of flexible assets, while also enabling Thermify to demonstrate scale-up and prove its benefits across a range of properties.
SHIELD cannot be funded through existing price controls or considered as part of business-as-usual activities due to its complexity, integration of technologies and new business models. SIF will support SHIELD to commercial viability and demonstrate its performance to future investors and stakeholders.
The alternatives to decarbonising residential heating are ground or air source heat pumps (ASHP), which have high upfront costs and add to householder bills and network pressures. SHIELD is cheaper for consumers as it uses waste heat from data processing and reduces network pressure by delivering a SLES through integration of renewable generation and storage.
The counterfactual for funding LCTs in social housing is social landlord ownership and financing with grant support. Both financial and managerial resources are too constrained to deliver a just transition in this way in a timely manner.

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Environmental - carbon reduction – direct CO2 savings per annum

Revenues - improved access to revenues for users of network services

New to market – products

New to market - services

Impacts and benefits description

SHIELD CBA has been undertaken at the Beta trial level and at GB wide scale.

Beta Trial: NPV of £1.1m up to 2055.
Forecast of 300 households taking up SHIELD solutions during Beta – with 100 receiving Thermify's HeatHub, and 300 receiving the PV, battery storage and smart energy management system.
Baseline: Without SHIELD, it is conservatively assumed that by 2025, half of the households switch to an ASHP and half will remain on gas boilers due to high upfront costs of ASHPs. In reality, a lower number of customers in the trial area may switch to heat pumps. No customers receive PV and storage solutions in the baseline.
GB scale: NPV of £2.2bn up to 2055.
SHIELD scaled across GB aligned to UKPN DFES Consumer Transformation scenario, applying to the segment of social housing which could uptake the technology versus an ASHP. This solution assumes each household receives a PV and Thermify solution. This is based on how the solution will operate outside of the trial which had specific constraints on its roll-out that won't occur at the national level.
Baseline: Without SHIELD, households would switch to ASHPs based on UKPN DFES Consumer Transformation scenario. No customers receive PV and storage solutions in the baseline
Financial - future reductions in the cost of operating the network
Baseline:
Switching from gas boilers to electric heating will require general enquiry (e.g. fuse upgrades) and network reinforcement costs due to additional electrical load.
Solution:
Deferral of network reinforcement of LV substations due SHIELD solution optimising energy usage and providing flexibility services.
Metrics:
MVA avoided through SHIELD and avoided reinforcement costs (£) - (£367k in trial, £497m in GB roll-out up to 2055)
Financial - cost savings per annum on energy bills for consumers
Baseline:
Heating and electrical costs can be estimated using the following assumptions:
The kWh of heating and electricity (non-heating) used per year, the current electricity and gas price, and the installation cost of a ASHP. Ofgem's average usage rates and electricity prices were used for all assumptions.
Solution:
Energy cost is £360/year based on Thermify's current proposition for heat-as-a-service they provide to consumers, with a reduced rate of £60/year for fuel-poor customers.
No upfront costs to customers for the PV or battery storage as they are owned by the social ESCo and incentives/revenues from the assets are returned to the asset owners. Similarly, P2P scheme will lower the unit rate of electricity.
Metrics:
Energy bill savings (£) - £4.2m in trial, £7.2bn in GB roll-out up to 2055
Environmental - carbon reduction – indirect CO2 savings per annum
Baseline:
GHG Emissions for heat pumps, gas boilers, and non-heating electricity is based on energy usage assumptions, carbon emissions factors for electricity / gas and the number / amount of heat pumps, boilers and electricity used.
Solution:
SHIELD assumes no GHG emissions associated with the heating (heat is a waste output from the data centre processing) or PV generation. Therefore, the benefit of the solution is equivalent to the size of the baseline emissions.
Metrics:
Carbon reduction (tCO2e) – 3.9k tCO2e in trial and 1.3m tCO2e in GB roll-out up to 2055.
Revenues - improved access to revenues for users of network services
Baseline:
No previous revenues for users
Solution:
Access to ESO balancing mechanism, demand flexibility services, firm frequency response and DSO flexibility services revenues for the owners of the flexibility assets.
Metrics:
Revenue generated from customers / exports (£) – £5.5m in trial and £4.7bn in GB roll-out up to 2055.
New to market – products/services
Outputs and Metrics covered by other benefit types.

Teams and resources

With such diverse expertise in project partners in Alpha, existing partners remain engaged for Beta with the addition of Essex Community Energy (ECE) who will be the Social ESCo in SHIELD. To ensure that SHIELD can be tested across a range of

households, five additional housing associations are being introduced as subcontractors.

Roles, skills, and experience of project partners

UKPN will be leading the project management work package. UKPN is the UK's largest electricity distributor delivering power to 8.5 million homes and businesses across London, the east and southeast of England, with a proven track record of delivering benefits through innovation, having delivered over £400m savings from innovation in ED1.
Essex County Council will be supporting UKPN in the project management work package. The proposed trials are located within their region and they can bring together a wide range of parties.
Eastlight will be leading the commercial agreements and funding structure work package. They are the housing association whose tenants will be participating in the trials.
Thermify will be leading the Beta deployment work package. Thermify are the key technology provider for SHIELD with their innovative distributed data centre heating product.
Power Circle Projects will be leading multiple key work packages during Beta. They are a social enterprise dedicated to supporting local communities and have delivered many community-led low carbon projects.
UrbanChain are a leading provider of P2P energy exchange services and innovative supply arrangements in the UK and will be developing SHIELD's P2P Trading offering.
Electricity North West will support in defining cross-DNOs collaboration and roll-out preparation. They lead projects which are complementary to SHIELD and will provide perspective to ensure SHIELD is designed for rollout across GB.
UK Community Works (UKCW) have experience with community engagement, supporting product development and will collaborate with Citizens Advice on tenant engagement.
Citizens Advice Essex will be leading the tenant engagement, utilising their engagement experience with vulnerable customers on their energy needs.
ECE will be entering energy supply, export and grid services agreements with households in Beta. ECE will also constitute the entity suitable to receive project finance for commercial scale up beyond Beta.

A range of companies will be subcontracted as detailed below to enable effective project delivery:

Power Circle Projects:

Simcott to deliver Thermify Heat Hub heating system installations
An installer to provide and install PV and battery solutions following a competitive process
Anderson Strathern to deliver householder agreements in simplified language, grid services partner agreement and updated regulatory review
Cornwall Insights to deliver energy and grid services market forecasts to support financing of scale up and projection of revenue streams and customer benefits.
AmpX to deliver more accessible household energy control interfaces
Talking Mats to develop the support package for tenants with communications difficulties
GivEnergy (or another IT consultancy) to develop APIs to facilitate billing data transfer

UKPN:

PNDC to perform grid impact assessments to evaluate possible effects or unbalances caused by SHIELD's roll-out

Citizens Advice Essex:

Local Citizens Advice to source advisors for tenant engagement via home visits and phone calls

UK Community Works:

University of Southampton for audit and support with the Monitoring and Evaluation strategy.
Up to five housing associations to host a minimum of 20 SHIELD energy systems

Thermify:

Kensa to support the testing of the Thermify-Kensa integration. They are a leading technology provider for ground source heat pump systems

In addition, engagement with potential tenant participants for Beta is planned and will be vital for successful delivery of the trial.

Therefore, across the consortium, the project will have access to the required resources, assets and facilities for a successful Beta Phase.

Project Plans and Milestones

Project management and delivery

Eight work packages (WP) are proposed for Beta with clear ownership set out in the accompanying Gantt chart and project management template:
WP1: Project Management (UKPN, ECC supporting)
Aim: Ensure the successful execution of SHIELD Beta, ensuring timelines, budget, and SIF requirements are adhered to
WP2: Technical evolution (PCP)
Aims: Validate Thermify's technology, update the technology following wind pilots, and to develop grid services
WP3: Commercial evolution (PCP)
Aim: Develop the tenants' contract suite and P2P supply offering
WP4: Regulatory evolution (PCP)
Aim: Ensure completion of regulatory sign-offs (Appendix Q and SAP11) ahead of trial and update regulatory reviews accordingly
WP5: Inclusion evolution (CAB)
Aim: Support vulnerable customers through support packages, develop inclusive tenant interfaces and test alert services
WP6: Beta recruitment (UKCW)
Aim: Recruit targeted number of tenants for Beta installations
WP7: Beta installations (PCP)
Aims:
Monitor trial through tenant surveys and automated data collection from equipment
Deploy SHIELD solution across two phases
WP8: Preparation for wider roll-out (PCP)
Aim: Prepare for SHIELD BAU transition while defining and conducting collaboration and dissemination activities
ECC will support UKPN for project management in SHIELD. The approach will include weekly progress meetings where the risk register, Gantt chart and project plan are reviewed. UKPN will complement the Council's approach using its own proven innovation governance processes.
There are several key risks which SHIELD has highlighted and plans to mitigate during delivery, including:
Delays in Thermify production or poor performance
Mitigations include: diverse range of component suppliers, growing Thermify team, 12-month monitoring of Alpha installations prior to a phased Beta rollout. SHIELD will also be tested using heat pump technology in Beta, providing an alternative to the HeatHub if required.
Appendix Q certification not secured for Thermify system, limiting scale of roll-out prior to resolution.
Mitigations include: limited roll-out in initial phase prior to Appendix Q to reduce delays, with additional time dedicated to this activity for Thermify and inclusion as Stage Gate 2 criteria
Sign-ups for Beta trials not secured or not representative of vulnerable groups
Mitigations include: expand the pool of participating social landlords, explore installing SHIELD empty homes and then introducing the system to new tenants. Citizens Advice will engage with potential participants and assess relevant vulnerability criteria, ensuring SHIELD is tested on target groups, and inclusion as a Stage Gate 1 criteria
Consumer engagement is a key element of the project. We will develop a comprehensive consumer engagement strategy , ensuring that project activities do not negatively impact consumer energy services. Supply interruptions are not anticipated, however, to reduce any risk the project will not remove legacy heating systems until all parties are satisfied that Thermify is performing as expected as per the project stage gates.
Stage Gate 1: Initial roll-out criteria met – June-2025, post initial tenant recruitment phase
Adequate number of tenant sign-ups with confirmed installation feasibility
A large majority of participants are in low-income or fuel-poor households
Completed review of Alpha pilot with proven performance and reliability of SHIELD solution
Stage Gate 2: Successful scale-up criteria met – June-2026, post initial SHIELD rollout phase
Successful SHIELD rollout to adequate number of properties in wave 1
Proven SHIELD performance in homes
Review tenant feedback with any outstanding issues addressed
Successful completion of Appendix Q process for Thermify to ensure suitability for rollout to wider housing associations.
Following each stage gate, an assessment will determine the most appropriate course of action which may include delaying progression or using alternate heating technology to reduce potential risks to both partners and consumers.

Key outputs and dissemination

Detailed project deliverables and organisations responsible can be found in the Project Management template and Gantt chart, however key aims throughout SHIELD's Beta include:
Completion of a phased trial in up to 300 households to evaluate SHIELD's performance, including the SLES and HeatHub technologies and the social ESCo commercial model
Review of benefits delivered and impact made to the targeted low-income residents
Evaluation of alternative LCT options to improve SHIELD's efficiency, including heat pumps and roof-top wind generation
Evolution of commercial model, including use of DSO flexibility services and P2P supply options
Preparation for wider roll-out post Beta, including network impact assessment, market scoping and review of lessons learned throughout Beta
Detailed project deliverables and organisations responsible can be found in the Project Management template and Gantt chart, however the key outputs of each work package are:
WP1 – Project Management (UKPN/ECC): Project plan, annual progress reports and closedown report
WP2 - Technical evolution (PCP): Technical capacity report and updates, grid services assessment
WP3 - Commercial evolution (PCP): Tenants' contract pack, contract suite & P2P supply offering
WP4 - Regulatory evolution (PCP): Thermify's SAP 11 assessment and Alpha regulatory review updated
WP5 - Inclusion evolution (CAB): support package and inclusive interfaces for tenants, tests results of alert services
WP7 – Beta installations (PCP):
Energy services delivery quarterly report for SLES and Thermify installations deployment (waves 1 and 2)
Stakeholder engagement: survey and questionnaire design, surveys results analysis from different waves, final report on all stakeholder engagement from trials
WP8 - Preparation for wider roll-out (PCP):
WP roadmap, inputs for LAEP update, ECO4 accreditation, SHIELD MOBs assessment, collaboration report,
Local P2P market scoping, scale-up assessment for Distribution Network, funders and other stakeholders
To ensure that these outputs contribute to the energy sector's wider knowledge base and aid future innovations, learnings developed in SHIELD will be shared both within and externally to UKPN. SHIELD's dissemination approach is developed based on UKPN's previous experience of running successful innovation projects. All UKPN Beta projects will be uploaded to the Smarter Networks Portal and feature on UKPN's website with specific project learnings being disseminated at the Innovate UK Show & Tell events. In addition, UKPN will look to share project successes and insights via its social media channels with the possibility of publishing to external media where appropriate.
Other project partners will also be sharing key outputs throughout Beta to outline the progress being made, namely:
PCP: Sharing SHIELD project quarterly reports, progress and performance at various conferences and events, in meetings with social landlords across the UK and on the PCP website.
ECC: Sharing key lessons learned, particularly on fuel bill reduction, LAEP activities and SLES operations through relevant groups ECC is part of, including the North and South Essex Councils Hubs and their Net-Zero Innovation Network.
UrbanChain: Sharing key performance details throughout SHIELD of the P2P model, including details of energy matching and tariffs through quarterly report updates and sharing of press releases detailing project performance on the UrbanChain website.
UKCW: Sharing of project level outputs and key lessons learned throughout on the UK Community Works website, directly with social landlords across the UK and to other local authorities.

Commercials

Intellectual Property Rights, Procurement and Contracting (not scored)

The parties agree to adopt the default IPR arrangements for this project as set out in Section 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 anticipate that the Beta will result in the creation of IPR that can be freely disseminated., There is 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.

Subcontractors identified in 'Team and Resources' will generally be direct sourced, however, due to their high-value any sub-contracts for supply and install of the PV and battery units will be awarded following evaluation of quotes from multiple suppliers, ensuring good value for money for the project and its consumers.

Commercialisation, route to market and business as usual

Beta will aim to:

Assess SHIELD's performance in 300 homes in Essex
Develop the solution through continuous improvement, facilitating transition to BAU
Provide the evidence base to support national rollout with private project finance
Extend the SHIELD proposition for participation of private landlords and tenants, and low-income homeowners. The addressable market in social housing alone is c4.8m homes and will aid SHIELD's scaling.
Test the SHIELD proposition with other technologies (wind generation and Electric Vehicle incorporation) to assess their potential

As lead partner and DNO for the Beta trial region, UKPN has ensured support of senior stakeholders, with involvement in the project being signed off at CEO level. Additionally, UKPN has confirmed its wider teams and processes are suitably prepared to transition to BAU and support the roll-out of SHIELD.

The existing Connections process at UKPN has been proven to work for SHIELD in Alpha. An impact assessment will inform if further adjustments needed to the process.
The Grid Services WP will work with the UKPN DSO and anticipates utilising existing flexibility products, whilst ensuring that they are accessible for SHIELD and its consumers.

SHIELD seeks to advance, while not undermining, the development of competitive markets. The services developed create additional market offerings and will be available to all eligible participants, namely due to collaboration with other DNOs, funders and stakeholders in WP8. Any required change management to adjust existing services will be performed by UKPN and shared as part of collaboration activities to ensure these can be applied with other DNOs.

SHIELD's longer-term vision is to scale to delivering 100,000+ solutions per year by 2030.
To do so, SHIELD commercialisation will be led by PCP who have experience deploying SLES and other community-led projects. PCP is already in dialogue with prospective funding partners about SHIELD's potential role in other projects, including high volume social impact funders. It is also engaging with institutional funders via separate Innovate UK supported projects, which UKPN and other project partners are involved in. The investors would form an ESCo and own the flexibility assets, receiving grid services revenues from these. PCP would agree a commercial management contract with the ESCo to install and operate the SHIELD solution on behalf of the company.

When scaling to other regions, SHIELD will approach local councils and housing associations with the solution, its business case, and its accessible finance model. The customer value proposition and business case for financing are:

Customers can access low-cost heating as this is a waste output of the distributed data centre. Distributed data centre providers can provide this at a low cost as their primary source of revenue is from data processing services, not heating.

Customers do not pay for the storage and generation technologies as these will be owned by the ESCo, with revenues and incentives from export and grid services returned to them.
For social and private landlords, more affordable heating results in less damp, improved tenant health and better maintained housing. It will also contribute to meeting energy efficiency and climate-related regulations.
For data centre users, low emission data services with positive social impact will contribute to meeting customer CSR objectives.
For network and system operators, the higher number of integrated and flexible LCTs will reduce peak demand and the need for network reinforcement, whilst improving resilience.

UKPN's internal governance processes have engaged senior personnel in the project. Sign-off is at CEO level and there are key requirements for buy-in from the Executive in relation to realising financial benefits to networks users, fair competition in procurement, compliance with network connection obligations, and ensuring the integrity and safety of the network.

Policy, standards and regulations (not scored)

A regulatory review conducted before Discovery and updated in Alpha by PCP demonstrated that the model proposed for provision of energy services to households is consistent with regulatory requirements and does not require a derogation. However, several regulatory barriers may hinder delivery to some degree either at Beta or in BAU. These include:

For balancing mechanism revenues to be generated, the householder would need to agree to their electricity supply contract being with a licensed supplier which supports residential half hourly settlement. Residential half hourly settlement is only supported by some suppliers at present. We understand that Ofgem plans to require all suppliers to support residential half hourly settlement by 2026/27
For blocks of flats, if more than 50 kWh of PV is to be installed it would require planning consent in Scotland (this may hinder faster deployment in BAU)
Ofgem Code change P379 would enable more than one customer to draw a supply through the same boundary meter, however this is currently paused. Thermify would pay its energy supplier directly for the electricity which its HeatHub consumes in the home so the code change is of interest. Currently it requires a separate boundary meter to be installed which increases cost and complexity of such installations
Consideration will also need to be given for future longer-term implementation of distributed data centres. In the future, policy may change and restrict the scope of data that could be held in distributed data centres located within customers' homes due to the cyber security risks

To ensure that this understanding remains up-to-date and identified barriers do not hinder delivery, additional regulatory reviews will be conducted every six months throughout Beta, feeding other WPs and leading to adjustments if required.

Consumer impact and engagement

Our work in previous phases shows that SHIELD generates a range of benefits for consumers, resulting in direct positive impacts including:

Typical household: c. 20% reduction in household energy costs against their current payments
Fuel-poor household: c. 40% reduction in household energy costs
Carbon emissions reduction: 90+%

The result of this cost saving will be of great financial benefit to the consumers targeted by SHIELD as most are in low-income households and many in fuel poverty.

The flat-fee model for unlimited heat from Thermify will reduce incidence of underheating. This means households can properly heat their homes, reducing the risks of health conditions caused by damp, mould and other impacts seen in under-heated properties. It is therefore expected that SHIELD will lead to a large quality of life improvement in terms of:

Reducing energy costs
Improving health and wellbeing outcomes
Enabling households to take meaningful action to reduce carbon emissions

Consumers will play a central role in the design, development and implementation of the project, mainly through their feedback, which is crucial to ensuring SHIELD's performance and consumers' satisfaction. Although throughout Beta data will automatically be collected to assess SHIELD's usage and performance, to ensure that households are receiving the expected benefits we will engage with tenants through regular surveys to collect qualitative and quantitative data:

Feedback on the solution
Tenants' comfort levels
Impacts on household finances

This customer-centric approach will feed into ongoing service design and development of SHIELD's customer journey.

In Alpha, the engagement with Housing Associations was focussed on better understanding their installations, the technologies used and their planned tenants' engagements. Moving forwards to Beta, engagement with Housing Associations is paramount to secure the tenants' sign-ups and ensuring the project design, development and implementation meet their needs so they can be onboarded.

SHIELD specifically targets vulnerable consumers in social housing and low-income tenants in privately rented accommodation. Consumers in these positions often have additional needs which must be carefully considered to ensure SHIELD is accessible and are discussed in one-to-one meetings held by Citizens Advice prior to tenant sign-up. As a result, SHIELD and its tenant interfaces are built using inclusive design principles, resulting in simple to use control systems which are accessible for vulnerable customers and those with low digital skills. Further enhancements to inclusivity are explored in the 'Inclusion Evolution' work package, including simplified contracts and communication frameworks to ensure tenants with communication difficulties can give their consent and express their views.

Citizens Advice will be using their extensive experience working with vulnerable clients to ensure SHIELD's overall service design and customer journey is appropriate. Once a household has expressed an interest, they are offered a one-to-one meeting. During this meeting, technology (size, location, operation), installation process, billing, and time-of use tariffs are reviewed to make estimates of cost and carbon savings compared to their present system. Risks and impacts are also discussed, which include: the equipment not performing as planned or people struggling to understand and use the new system. If a household wishes to proceed, we provide plain English versions of contracts for review and answer any questions that arise.

Value for money

The total project costs for SHIELD are £9,887,287 and the total funding request is £5,401,332, with partners contributing to 45.4%. This is balanced across the project partners as follow:

UKPN:
Total costs: £999,419
Total contribution: £165,000 (16.5%)
Total SIF funding request: £834,419

PCP:
Total costs: £468,475
Total contribution: £46,848(10%)
Total SIF funding request: £421,627

Thermify:
Total costs: £4,931,300
Total contribution: £2,420,000 (49.1%)
Total SIF funding request: £2,511,300

ECE
Total costs: £2,722,250
Total contribution: £1,777,500 (65.3%)
Total SIF funding request: £944,750

UKCW

Total costs: £512,208
Total contribution: £51,243(10%)
Total SIF funding request: £460,965

Eastlight
Total costs: £37,080
Total contribution: £3,708 (10%)
Total SIF funding request: £33,372

ECC
Total costs: £50,008
Total contribution: £5,001 (10%)
Total SIF funding request: £45,007

UrbanChain
Total costs: £47,517
Total contribution: £4,752 (10%)
Total SIF funding request: £42,765

CAB
Total costs: £71,130
Total contribution: £7,113 (10%)
Total SIF funding request: £64,017

ENWL
Total costs: £47,900
Total contribution: £4,790(10%)
Total SIF funding request: £43,110

Subcontractors costs:
PNDC: £111,359
Kensa: £30,000
Simcott (HeatHub & tech Installation): £805,000
Local Citizens Advice: £56,130
UKCW's subcontractors, inc. five social housing associations: £124,500
PCP's subcontractors: £176,175
Battery supplier (selected following a quotation assessment): £990,000, with £165,000 covered by UKPN and £165,000 covered by ECE.
PV supplier (selected following a quotation assessment): £1,612,500, covered by ECE

10% of the associated subcontracting costs are covered by the partners unless otherwise stated.

The contribution from Project Partners for the whole project is 45.4%, significantly above the minimum 10% contribution, demonstrating strong commitment to the project from partners as well as value for money to customers. The project partners are keen to self-fund as much of the project technology as possible and have committed to:

100 out of the 300 batteries to be installed are privately funded by UKPN and ECE
100% of the PV will be privately funded by ECE

SHIELD aims to attract additional funding throughout Beta by demonstrating its performance and benefits as trials progress. This may enable further reductions in SIF funding required for the battery units.

Other key points in relation to value for money are detailed below:

The business case and CBA identify savings for customers on energy bills, reduced network costs and carbon savings. Without UKRI funding, it is very unlikely that these will be unlocked in the current market mechanisms.
The Social ESCo model enables LCTs to be made available to low-income households at zero upfront cost. Heating use will cost consumers just £360 per year and the PV and Battery solution will vastly reduce energy bills, providing excellent value for money for consumers. For consumers assessed as in fuel poverty, the heating cost will be reduced to just £60 per year to provide

additional benefits to those with the greatest needs.
The large consortium of partners collaborating together on SHIELD provide a unique set of expertise and skills to the project, at a reduced cost.
Battery and PV supplies represent considerable expenses. Quotations assessment have been performed in preparing this application and will be performed in Beta to ensure that the work will be procured at a competitive rate
SHIELD also aims to establish its footprint in the industry by supporting the development of LAEP or collaboration across projects, DNOs and the industry in general. UKRI fundings will provide a new dynamics that we hope will boost collaboration within the industry

Is this an associated Innovation Project?

- (•) Yes (please remember to upload all required documentation)
- ( ) No (please upload your approved ANIP form as an appendix)

Supporting documents

File Upload

SIF Beta Round 2 Project Registration 2025-01-23 3_51 - 86.7 KB

Documents uploaded where applicable?

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