# Show and Tell

## SIF Round 2 Alpha - SHIELD

25 April 2024

# Agenda

1. Partners introduction
2. The problem SHIELD aims to solve
3. Project objectives
4. Alpha activities: developing the SHIELD proposition
5. Findings: Projected customer benefits
6. Findings: other benefits
7. Findings: user engagement
8. Looking ahead to Beta Phase
9. Key takeaways

UK Power Networks
Delivering your electricity

# Alpha Phase partners

| | |
|---|---|
| UK Power Networks | UK Power Networks is the Project Lead. UK Power Networks owns and maintains the electricity network, including substations, cables and overhead lines required for the installation of Low Carbon Technologies. They also procure flexibility services to reduce network reinforcement. |
| Essex County Council | The proposed trials are located within Essex County Council's region and they can bring together a wide range of parties. They led the Project Management work package. |
| Power Circle Delivering Local Energy | Power Circle Projects is a social enterprise dedicated to supporting social housing providers, private homeowners, communities and have delivered many community-led low carbon projects. They led the overall proposition development work as well as the technology and modelling work . |
| citizens advice Essex | Citizens Advice Essex have the expertise and engagement experience with vulnerable customers on their needs relating to energy and heat and led on the tenant engagement |
| Eastlight Community Homes | Eastlight's tenants are participating in the trials and as a housing association, they led work on the the commercial agreements. |
| CW community works | UK Community Works have extensive experience supporting engagement activities and drafted the tenant engagement strategy, plan and materials. |
| UrbanChain | UrbanChain are the leading provider of Peer-to-Peer energy exchange services in the UK and helped SHIELD to design the interactions and operations between consumers, prosumers and generators. |
| thermify | Thermify are the key technology provider for the SHIELD proposition with their innovative distributed data centre heating product. |
| electricity north west | As the partner network, Electricity North West delivered the Learnings and Scalability work package, ensuring SHIELD is designed for wider rollout across GB. |

# The problem SHIELD aims to address

## Domestic retrofit is slow

- We are decarbonising housing stock too slowly to meet 2050 Net Zero targets
- Fabric first approaches are expensive, slow, and do not always deliver substantial savings
- Social landlords are reliant on scarce grants to drive deep domestic retrofit

## Domestic retrofit is expensive

- Households do not have the capital to invest in decarbonisation
  - The bottom 50% of households have £2,060 average liquid capital*
  - The bottom 80% of households have £12,557 average liquid capital*
- Only the top 20% of households can afford to retrofit their homes

The current approach to decarbonising heat and energy in consumers' homes is not inclusive of vulnerable consumers, low-income households, and social housing residents due to its high upfront costs.

**SHIELD aims to integrate new approaches, technologies and business models to make the decarbonisation of heat and energy affordable and accessible.**

*ONS: Household total wealth in Great Britain, April 2018 to March 2020


Cost of living: Energy suppliers failing struggling customers - Ofgem

22 November 2022 Comments


UK households with communal heating facing 350% rise in energy costs

Surge in energy costs filtering through to low-income households on shared heat networks

Lambeth council tenants 'in precarious position' after 350% service charge rise


Fuel poverty in UK 'hit one in four in social housing last winter'

Households that switch off heating create conditions that could be unhealthy or even fatal, says charity

UK Power Networks
Delivering your electricity

# SHIELD's objective is to test two innovations

## Technical and system integration innovation

This innovation integrates solar PV, electrical and heat batteries, and the Thermify HeatHub. This system provides low-cost, low-carbon heat and power to the household.

The Thermify system is a small, distributed data centre that harnesses waste heat from its operation to provide heat and hot water.

The SHIELD energy system can easily be integrated into smart local energy systems to help balance supply and demand.

## Business model innovation

This innovation involves utilising a social enterprise energy services company (ESCo) that can:

- Develop, install, and operate low-carbon energy systems on behalf of social landlords and homeowners.
- Aggregate these systems to secure patient, low-cost finance from institutional funders

Successful development of these innovations will:

- Reduce energy costs for fuel-poor households
- Enable us to access institutional capital to scale-up deployment of low-carbon measures
- Speed up decarbonisation of heat and power for vulnerable and fuel-poor households

# Alpha activities: developing SHIELD's proposition

## Solution development

- Route to market and Beta Phase commercial, funding and operating model defined
- Supplemental Tenant Agreement and Energy Supply Agreement written and entered into by tenants
- Electricity supply and peer to peer contract options developed for Beta Phase
- Detailed technology design, implementation plan, potential supply (data centre demand)

## Tenant engagement

- Identified social housing tenants willing to participate in Beta Phase
- Identified housing associations that wish to pilot SHIELD systems in Beta Phase

## Benefits analysis

- Modelling of tenant cost savings and carbon emissions reduction

## Pilot deployment

- 30 site surveys
- Deployed SHIELD pilot in two homes
- Monitoring and evaluation plan in place and underway

UK Power Networks
Delivering your electricity

# Findings: Projected customer benefits

### SHIELD system energy costs

- Flat fees for heat/hot water: **£30 per month**
- Flat fees for heat and hot water if in fuel poverty: **£5 per month**
- Cost per kWh for electricity from the SHIELD system: **16 pence per kWh**

### Customer Impact

- **~20% reduction in energy costs** against their current payments
- **~40% reduction** in energy costs for **households in fuel poverty**
- Greater reductions possible dependent on circumstances
- **90+% reduction in carbon emissions**

### The system is simple to install and use

- Tenants set heat and hot water requirements as they would for a gas boiler
- Optimisation of the system is automated
- Tenants don't need to make behavioural changes to make savings
- Less risk of health issues from cold: flat fees for heat and hot water means no compromise on comfort, improving health outcomes
- Can be deployed fast: 5 days maximum to install

UK Power Networks
Delivering your electricity

# Findings: Other benefits

## Grid operator benefits

- Avoiding grid reinforcement costs: reduced network reinforcement due to flexibility services being offered to the grid

## Reduction in greenhouse gas emissions

- There are greenhouse gas emissions benefits from consumers switching from traditional gas boilers to the SHIELD solution and from heat pumps to the SHIELD solution
- There are no greenhouse gas emissions associated with heating for the SHIELD solution as heating is a waste output from Thermify's distributed data centre

## Benefits to social landlords

- Increases tenant disposable income (reduced risk of rent arrears)
- Less damp and better-maintained housing: Reduced maintenance issues from underheating (damage from damp, mould)
- Unlike other retrofit LCT technology, it's well-suited for hard-to-treat properties (old, listed, complex archetypes)

## Data centre user benefits

Data centre users can access a service that combines low emissions with a high positive social impact. This helps customers to meet Corporate Social Responsibility and Environmental, Social and Governance targets.

UK Power Networks
Delivering your electricity

# Findings: User engagement

## Discovery Phase: Key findings from respondents

- Tenants are very concerned about the cost of energy (average answer was 9.1/10)
- Tenants are concerned about climate change (average answer was 7.8/10)
- Tenants are interested in learning more about the low-carbon energy system being developed by the SHIELD team (average answer was 7.8/10)
- 68% of tenants would like to try and an additional 26% may be interested in trying out SHIELD technologies in 2024

## Alpha Phase

- We engaged with 420 Eastlight tenants in total
- 73 detailed 1:1 interviews conducted by Citizen's advice resulted in 59 Beta phase sign-ups

To ensure we had a significant number of households in fuel poverty, we recruited another 15 households that had independently contacted Citizens Advice Essex due to concerns over energy costs.

We have a total of 74 households that want to trial the SHIELD energy system, exceeding the number of households required for the first wave of Beta roll-out

UK Power Networks
Delivering your electricity

# Looking ahead to Beta Phase

## Approach

- Create evidence base for social ESCo model by retrofitting up to 300 participating homes (scale required for ESO and DSO grid services provision assuming a 3.68 kWp export per home)
- Recruit participating households from other social landlords to prepare for scaling
- Approach designed to suit public and private housing, pilots in private housing

## Key issues that we will address in Beta Phase

- Appendix Q – progressing final Building Research Establishment (BRE) Appendix Q approval will be important due to impact on social landlord's ability to meet energy efficiency targets in participating homes as these are based on Energy Performance Certificate (EPC) ratings
- We will demonstrate several heat storage options in Beta Phase (including new Q-Zeta low-cost high-capacity long duration storage solution)

UK Power Networks
Delivering your electricity

# SHIELD contact details

innovation@ukpowernetworks.co.uk

info@powercircle.org.uk

https://www.ukcommunityworks.org/