

Project case study: Clean Heat Streets

Theme: High-density deployment of heat pumps

Heat Pump Ready: This project was part of Heat Pump Ready Stream 1, a UK government funded programme designed to test innovative methodologies for achieving high density deployment of heat pumps in homes. Further details on Stream 1, including scope and eligibility are available here: [Heat Pump Ready Programme: Stream 1, Phase 2 - GOV.UK](#)

Project name: Clean Heat Streets

Location: Rose Hill and Iffley, Oxford

Lead organisation: Samsung Electronics

Partner organisations: Oxfordshire County Council, Oxford City Council, University of Oxford, Oxford Brookes University, Scottish and Southern Energy Networks, GenGame, Passiv UK, Alto Energy

Key sub-contractors: Rose Hill and Iffley Low Carbon

Funding:

Budget: £3,206,449

Amount spent: £2,037,637

Dates active:

Phase 1 (feasibility): March to December 2022.

Phase 2 (mobilisation): March 2023 – March 2025. See feasibility report [here](#).



1. The project at a glance: Clean Heat Streets

Where?

- The Clean Heat Streets project focused on the Rose Hill and Iffley area of Oxford. The area was selected based on the consortium's existing knowledge that homes in the area had reasonable fabric standards and, importantly, that there was already an active community group "Rose Hill and Iffley Low Carbon" aiming to make Rose Hill the first zero carbon estate in the country¹.
- Following an approach developed by the Centre for Sustainable Energy, the consortium conducted household-level assessments of technical, digital, financial, and social capabilities, combined with analysis of headroom in the local electricity network. This identified a specific target area within Rose Hill and Iffley.

Who?

- Samsung led a project consortium, with key roles delivered by Oxfordshire County Council, Oxford City Council, the University of Oxford, Oxford Brookes University, Scottish and Southern Energy (SSEN), GenGame, Smart Metering Services (SMS), Alto Energy, and Passiv UK.

What?

Clean Heat Streets aimed to coordinate the deployment of domestic heat pumps for Rose Hill and Iffley residents. The project:

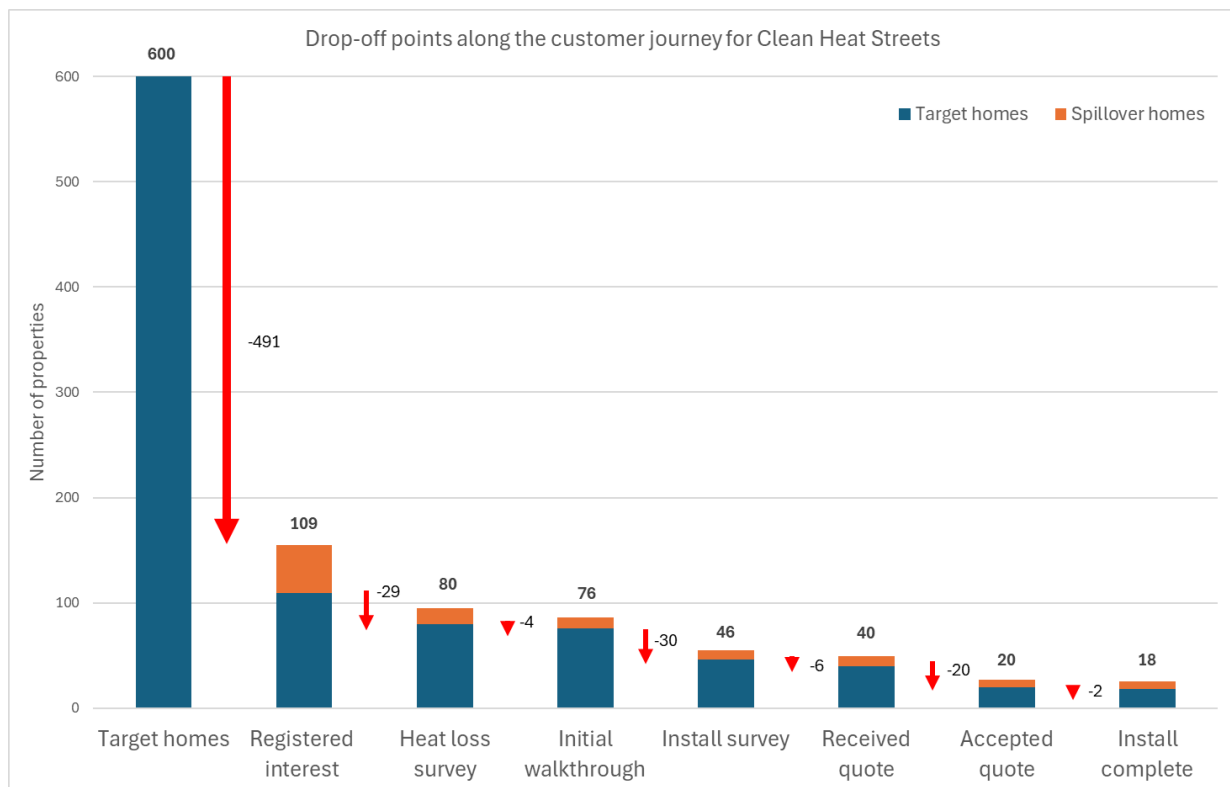
- Pursued a hyperlocal delivery approach with face-to-face engagement prioritised over digital engagement; a full-time community engagement officer, employed by Oxford City Council, was recruited to lead much of the engagement.
- Facilitated social norming and peer-to-peer learning by creating show homes in the target area. Show home residents became 'heat pump champions' and hosted open days, allowing residents in the area to experience a completed install and receive impartial advice from a neighbour.
- Offered free home energy surveys to engage customers and outline the potential costs and benefits.
- Developed a pilot type-of-use tariff in collaboration with British Gas. The tariff offered half-price heat pump electricity for consumers who enrolled in a demand-side response trial of their heat pump.
- Developed a dedicated website and information and data management system (IDMS) to manage the consumer journey digitally.
- Used remote monitoring of heat pump performance data to:
 - develop an optimisation algorithm to remotely adjust the weather compensation settings to increase efficiency;
 - provide information and reassurance to homeowners about the running costs over winter

¹ [Rose Hill and Iffley Low Carbon \(RHILC\) - Low Carbon Hub](#)

Results

- Of the target area (600 households), 109 residents (18%) registered an interest in the project as shown in Figure 1. 80 (13%) had a free initial survey, leading to 46 (7%) proceeding to an additional installation survey. 40 quotes were issued, of which 20 were accepted leading to 18 installations. 8 of these were funded through Heat Pump Ready with the remaining 10 homes, in target areas which did not meet the density requirements to proceed with Heat Pump Ready funding, receiving an install through Clean Heat Streets utilising Boiler Upgrade Scheme funding. These figures exclude the 6 show homes installations, funded under Heat Pump Ready as part of the project's consumer engagement strategy.
- Clean Heat Streets also supported 7 households with their heat pump installation on streets directly adjacent to the substation target areas (spillover homes), using funding from the Boiler Upgrade Scheme.
- In total Clean Heat Streets installers installed 31 heat pumps in the area.

Figure 1: Drop-off points along the customer journey for Clean Heat Streets for homes within and outside the target area



1.1. Overview of mobilisation activities

The key activities funded during the mobilisation phase for the Clean Heat Streets project included:

- **Building a deep understanding of the chosen area's social, technical and economic attributes and capabilities** to identify homes that were technically and socio-economically suited to a heat pump.

- **Developing a tailored, socio-economically sensitive engagement strategy** that addressed the specific needs and concerns of residents in each area.
- **Integrating Clean Heat Streets within the community** to build trust in the offer and leverage strong social relationships within, and between, subgroups. This included outreach to local groups (including local faith groups, the local primary school and the youth club), attending community events and hosting Clean Heat Streets events.
- **Establishing show homes and heat pump champions** to provide residents with a first-hand experience of heat pump technology in a local and familiar environment and in a house like their own.
- **Building awareness of the project** through show home open days, community events, and physical and digital marketing. Awareness building activities included several large-scale events themed around energy efficient heating and retrofit in the community centre.
- **Developing a software solution to manage the information and data flows** as residents moved along stages of the consumer journey.
- **Developing the value proposition** to create an offer seen as at least “as attractive” as a new gas boiler.
- **Engaging with the local authority housing and planning departments** to ensure the offer was made available to social housing tenants in the area and that installs complied with planning requirements.
- **Engaging with local authority Net Zero strategy officers** to ensure alignment with wider council strategy for Net Zero objectives
- **Engaging with energy suppliers** to develop a Clean Heat Streets tariff that reduces the operating costs for enrolled households.
- **Ensuring a highly positive pre-install, install, and post-install experience** by providing tailored support with significant 1-2-1 engagement led by a community engagement officer.
- **Providing remote monitoring and post-install support and remote optimisation of settings** to ensure residents’ heat pumps are working optimally.
- **Interacting with the local Distribution Network Operator** to ensure installed heat pumps are smoothly integrated into local networks.
- **Attending collaboration, learning and dissemination events across the Heat Pump Ready programme**, including quarterly learning workshops, the annual Heat Pump Ready conference, and external industry events.
- **Project management**, e.g. consortium engagement, KPI tracking, milestone reporting, monthly reporting meeting with the project monitoring officer and collaboration and learning manager, collating evidence for funding claims, and producing a final project report.
- **Conducting several large scale events** themed around energy efficient heating and retrofit in the community centre to raise awareness of the project.

- **Outreach to local groups** including local faith groups, the local primary school and the youth club.
- **Engagement with local tradespeople** to involve them in various aspects of the project including local heating installers (to train in installing heat pumps), carpenters and builders (to e.g. construct external sheds to house heat pumps), printers (to produce flyers and leaflets).

1.2. Delivery partners and roles

Table 1: Summary of consortium delivery partners and associated roles

Delivery partner	Roles
Samsung	<p>Project lead</p> <ul style="list-style-type: none"> • Consortium development and lead partner • Project management and reporting • Heat pump technology provider • Monitoring in-situ performance (via Samsung SmartThings) • Remote optimisation of Heat Pump performance via remote adjustment of flow temperatures • Value proposition development • Customer engagement • Development of project tariff with energy supplier • Development of the information and data management system (IDMS)².
Oxfordshire County Council	<p>Local authority</p> <ul style="list-style-type: none"> • Endorsement of the project by a trusted and recognisable brand • Strategic inputs on e.g. the grant regime for related measures and the role of heat pumps in Net Zero planning
Oxford City Council	<p>Local authority</p> <ul style="list-style-type: none"> • Endorsement of the project by a trusted and recognisable brand • Hired and seconded a full-time community engagement officer • Created linkage with City Council social housing department

² Coding and design of the platform was delivered outside of the consortium by a third-party software house, Global Logic.

**University of
Oxford**

Academic partner

- Statistical analysis of household energy demand and modelling of heat pump demand profiles
- Engagement strategy
- Community survey
- Value proposition development
- Project management and reporting

**Oxford Brookes
University**

Academic partner

- Area-wide capability mapping (informing feasibility assessment)
- Monitoring of heat pump interventions and DNO engagement
- Community survey to inform engagement and recruitment strategy

**Scottish and
Southern Energy
Networks (SSEN)**

Distribution Network Operator (DNO)

- Monitoring and managing the local electricity distribution network, including processing new connections
- Assisting in identifying potential areas of low grid constraints where high-density deployment of heat pumps would be feasible
- Substation monitoring
- Developing new procedures for bulk applications of heat pumps

GenGame

Consumer engagement

- Household engagement and marketing strategy lead
- Developing the Clean Heat Streets brand and logo
- Comparative cost assessment using historical energy profile data

**Smart Meter
Solutions (SMS)**

Quality assurance and consumer protection

- Cost modelling
- Heat pump commissioning settings
- Installer quality assurance
- Consumer satisfaction and protection

Passiv

Heat pump experts

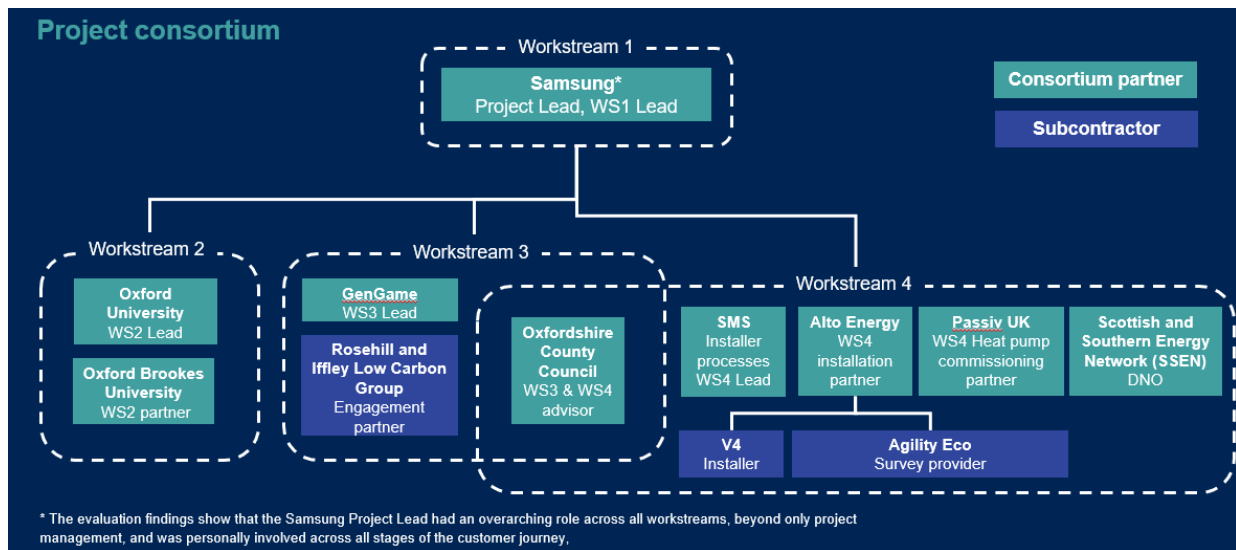
- Demand profiling and support to design work to help optimise heat pump performance

Alto Energy

Technology Installers

- Surveying, design, and installation leads
- Provision of aftercare and maintenance

Figure 2: Consortium organisation chart



The workstreams referenced in Figure 2 are:

- Workstream 1: Project management
- Workstream 2: Segmentation and analysis of energy demand and targeting
- Workstream 3: Methodology for household engagement and recruitment
- Workstream 4: Installer processes

1.3. Location and target homes

During the feasibility stage, the Clean Heat Streets project (led by Samsung) conducted a capability assessment within the Rose Hill and Iffley area of Oxford. The assessment used an approach developed by CSE, the Capability Lens. The approach was integrated into the Local Area Energy Mapping (LEMAP) tool developed by Oxford Brookes to consider each household's technical suitability, likely economic circumstances, and social and digital characteristics. Additional data layering of secondary substation headroom and household tenure allowed the project to score and rank every postcode in Rose Hill based on its suitability for a heat pump.

Table 2: Datasets used in the capability assessment

Dataset	Source	Purpose
Energy Performance Certificates	Open	Physical characteristics of the dwellings (floor area, built form, energy efficiency rating) and heating energy use

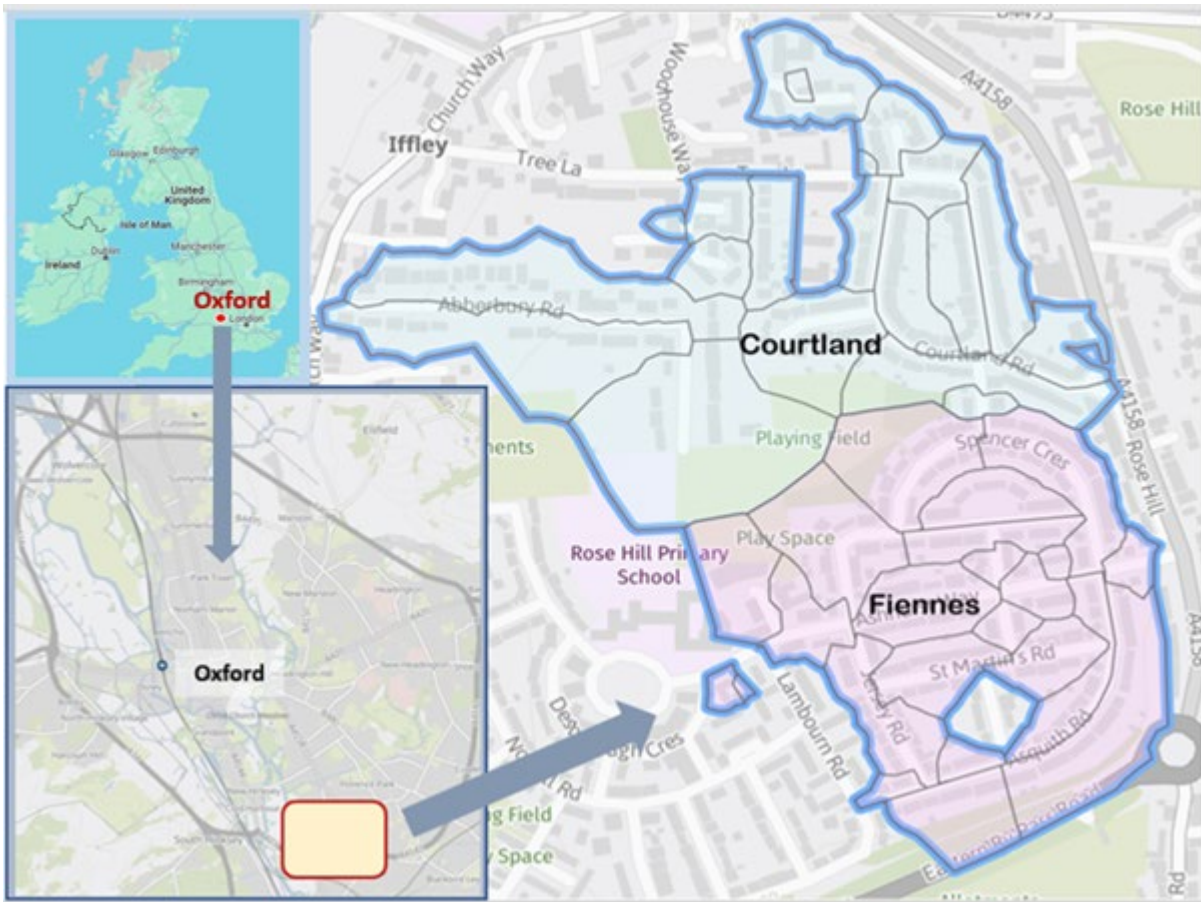
DESNZ Postcode level domestic gas and electricity consumption ³	Open	Postcode-level annual electricity and gas consumption for dwellings
OS AddressBase	Private	Matches postal addresses to household Unique Property Reference Number (UPRN)
Experian's Mosaic	Private	Consumer classification tools, including data related to age and gender, income and affluence, digital engagement, health, and lifestyle characteristics.
Acorn geodemographic	Private	
Geomni	Private	Detailed building information
SSEN local data	Private	Substation boundaries and feeder information

Table 3: Number of residents in the engagement and instalment process, by target group (not including 6 show home installations)

Target group	Homes in area	Registered interest (% of total homes)	Surveys completed (% of total homes)	Quotes accepted (% of total homes)	Installs completed through HPR	Installs completed outside of HPR
1	54	29 (54%)	22 (41%)	9 (17%)	8	0
2	43	6 (14%)	5 (12%)	1 (2%)	0	1
3	274	68 (25%)	49 (18%)	9 (3%)	0	8
4	229	6 (3%)	4 (2%)	1 (<1%)	0	1
Total	600	109 (18%)	80 (13%)	20 (3%)	8	10
Outside target group		46	15	7	0	7

³ <https://www.gov.uk/government/publications/postcode-level-domestic-gas-and-electricity-consumption-about-the-data>

Figure 3: Map of the target area in Oxford showing the target groups of the Clean Heat Streets project



1.4. The value proposition for customers

Clean Heat Streets aimed to “help Rose Hill and Iffley residents make the switch from gas boilers to modern, energy saving, clean and sustainable heat pumps”.

Research conducted with the householders revealed key pains and some areas where heat pumps could offer gains over and above existing incumbent gas boiler heating systems. The value proposition for the project was built around enabling these gains and relieving these pain points.

Table 3 Gains and pains in the Clean Heat Streets heat pump offer

Gains and gain creators	Pains and pain relievers
<p>Growing householder awareness of environmental problems and their solution. It gives an opportunity for householders to think globally and act locally. This is empowering and makes people feel good. As a gain creator the project provides education and ongoing</p>	<p>Reducing upfront costs. Offer a free technical survey and EPC rating, along with support to manage costs and expectations during the design phase.</p>

support for heat pump installation and usage, with post-installation advice from experienced "champions" to ensure efficient heating and cost reduction.

Creating a sense of community and energy citizenship from participation in the project. If you are Heat Pump owner in Rose Hill you join a supportive community of low carbon technology owners.

Environmental benefits. Encourages homeowners to switch from gas boilers to heat pumps, which reduce carbon emissions by 1/2 to 2/3, particularly for older boilers.

Reliability benefits. Heat Pumps are widely considered more reliable than gas boilers. Clean Heat Streets ensures high-quality, reliable installations by accredited professionals, with post-installation support for optimal system performance.

Improved heating service which could potentially eliminate damp, mould, cold spots and condensation.

A healthier home which is less likely to be underheated and which maintains relative humidity at levels which reduce damp and mould and the levels of viruses and other pathogens.

Reducing running costs. Assist users in optimising heat pump efficiency, potentially lowering running costs, and offers guidance on Time of Use tariffs to maximize savings.

Maintenance Costs. Highlights the reliability and durability of heat pumps, which can reduce long term maintenance expenses.

Eliminate supplemental heating. Because of its continuous and whole envelope operation versus a gas boiler, the heating regime recommended for heat pumps, allowing them to operate most efficiently, will tend to eliminate cold spots, negating the need for additional heating.

Lack of technical knowledge on suitability of property and overall feasibility. Anxiety and lack of knowledge on the feasibility or appropriateness of the heat pump is a key barrier to taking the next step on the customer journey. Consequently, Clean Heat Streets relieves this pain by providing a free technical survey to assess property suitability and also guides homeowners to available funding opportunities.

Installation practicalities including the issue of space for tanks and bigger radiators. These details can make or break a feasible installation that meets the householder's needs. Consequently, Clean Heat Streets offers an intensive home visit to negotiate the best position for equipment and radiator upgrades. The project also offers solutions like slimline tanks or alternative placement options for properties with limited space such as purpose-built insulated sheds.

The project amplified the potential benefits of heat pumps versus conventional gas boiler systems but acknowledged that many residents would be unaware or unsure of heat pump technology. To deliver the value proposition successfully, the project focused on **providing residents with tailored and trusted guidance** through:

1. Dedicated engagement and support

The consortium, led by a full-time engagement officer, had several touchpoints with residents (see ‘approach to customer engagement and recruitment’ in Section 2.5.). Most engagement was face-to-face and household-specific, allowing the project to understand individual circumstances and provide tailored support and solutions. For example, some residents with loft space were happy to place a hot water cylinder there, whilst others were concerned about the value of their house decreasing because of restrictions on loft conversions. In other cases, some households were content with a higher capital outlay to achieve lower operating costs (e.g., through heating emitter upgrades), whereas other households had a lower capacity and/or appetite for upfront costs. The project aimed to provide value by working collaboratively with residents to identify solutions to match their wants and needs.

Figure 4: An outdoor storage solution

An outdoor storage solution was identified for a resident without sufficient indoor space for a hot water cylinder. The project team worked with a local carpenter to design and build the shed, which housed the hot water cylinder and peripheral equipment⁴. In total, four outdoor shed units (19% of total) were installed.



2. Enabling peer-to-peer learning

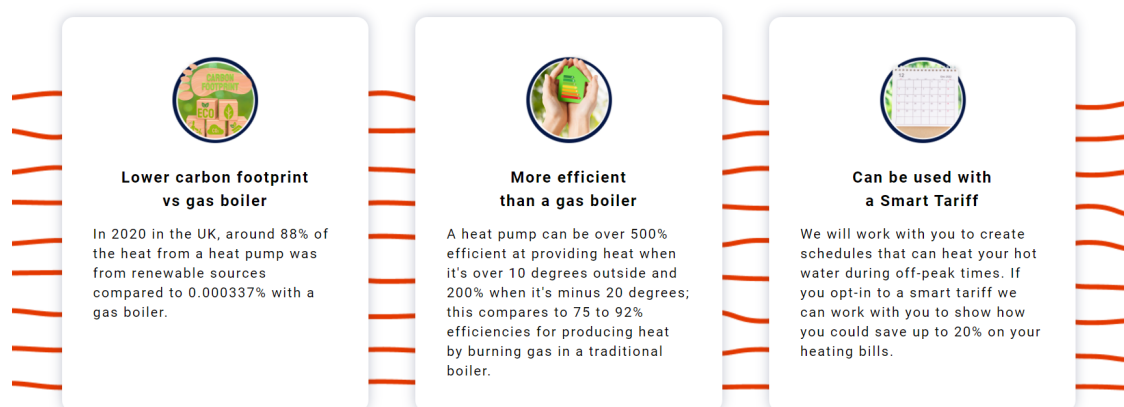
The project supported the concept that the community members having a heat pump installed through the project are the Clean Heat Streets project’s best advocates. To encourage this, the project facilitated resident-to-resident interactions using show homes and heat pump champions (see ‘approach to customer engagement and recruitment’). This allowed residents to experience an operating heat pump in a house like theirs, owned by someone in similar circumstances to themselves. For many residents, this was the first time they saw a heat pump working in a domestic setting, and it provided the opportunity to discuss the options with a local resident without the perception of commercial interest.

3. Integrating with existing, trusted, and local organisations

⁴ The project noted that, if they were to repeat the project, they would look to pre-construct the shed with equipment and peripherals built-in off-site, saving money and time if it can be done at scale and delivered to the project site.

The project leveraged the involvement and endorsement of Oxfordshire County Council, Oxford City Council, the University of Oxford, Oxford Brookes University, and the Rose Hill and Iffley Low Carbon group. All organisations were recognisable and trusted by residents, and their involvement increased the legitimacy and customer confidence in the offer. This was particularly important due to the low penetration levels of heat pumps in the local area and the subsequent perception of heat pumps as a nascent and/or unproven technology. The project also utilised local installers (Alto Energy), further increasing customer confidence through the local provision of aftercare and maintenance. Local organisations, particularly the City and County Council, combined with Samsung’s global brand reach created a strong consortium image that residents could trust. Importantly, consumer trust in the proposition was not gained solely through organisational involvement. It required a stable, long-term presence of the consortium in the local area to build an association between residents and the project.

Figure 5: Marketing material showing the Clean Heat Streets value proposition



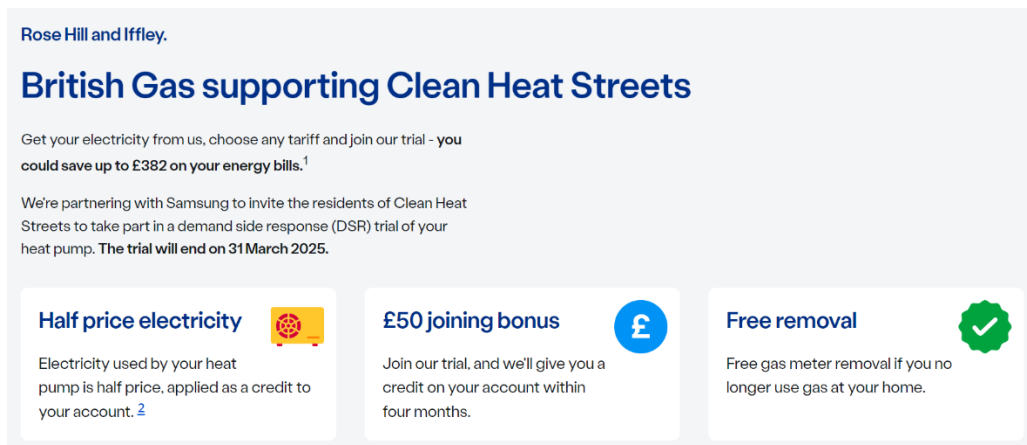
An attractive financial case for heat pumps – both upfront and ongoing costs – was the key driver for many residents. In addition to offering a tailored and trusted service, the Clean Heat Streets value proposition focused on **helping residents make heat pump systems cost-competitive with conventional boiler systems**. They did this through:

- **Offering a zero-obligation survey for free:** The project offered residents a free household heat loss survey worth approximately £400. The survey was used to understand the household’s suitability for a heat pump and provide an indicative quote. Offering the survey allowed residents to understand the implications of a heat pump for their home free of charge.
- **Type-of-use and time-of-use tariffs:** Samsung collaborated with British Gas to provide a type-of-use tariff for Clean Heat Streets participants. The tariff offered half price on electricity consumed by heat pumps (measured through the Samsung SmartThings app⁵) for consumers who enrolled in a

⁵. The SmartThings app allows consumers to manage Samsung smart home appliances and other compatible devices. It also allows users to monitor energy consumption and set heating schedules for compatible heat pump systems.

demand-side response trial⁶ of their heat pump. Enrolled consumers also received a £50 joining bonus and free gas meter removal for households with no gas use. The tariff was a pilot and had an end date of 31 March 2025. The project worked with residents to understand their usage patterns and recommend the most suitable tariff. Whilst some residents enrolled in the British Gas tariff, the project also offered support through cost modelling and remote heat pump operation for residents interested in other commercially available tariffs (e.g., Octopus Cosy, Octopus Agile).

Figure 6: Marketing material for the British Gas type-of-use tariff



- **Monitoring and operation of installed heat pumps**

All installed heat pumps were connected to Samsung's SmartThings app, which allowed for remote monitoring and control. Resident consumption data was tracked to ensure residents' usage profiles were compatible with high-efficiency and low-cost (tariff-dependent) operations. The data was used to identify residents who could benefit from preferable operating patterns, and subsequent engagement was conducted. Additionally, the data was used to remotely update the weather compensation controls for installed heat pumps⁷, improving their efficiency and reducing running costs. In addition to remote monitoring, the project planned post-installation visits, which took place one month after installation and one month into the heating season if the heat pump was installed outside of the heating season, to understand any concerns, answer questions, and inform residents of optimal usage patterns.

The value proposition highlighted that heat pumps can be cost-competitive with traditional heating systems. However, while energy bill savings are likely in most cases, they cannot be guaranteed. This is particularly relevant for households that currently underheat their homes for various reasons, including preference and cost-saving measures. For example, some households operate their gas boilers in short

⁶ The trial aimed not to drop the household temperature below the set point. Still, it could increase by up to 2 degrees above to preheat houses ahead of demand-side flexibility events and/or higher wholesale prices.

⁷ A weather compensation curve sets the relationship between external air temperature and heating system flow temperature, generally inputted into the air source heat pump (ASHP) controller at the point of installation. It is a static dataset that illustrates how the output of a heat pump should adjust based on outdoor temperature to maintain desired indoor comfort levels. If the curve is set too high, the system may deliver more heat (and use more power) than necessary. If it's set too low, the system may struggle to maintain comfort levels, which may lead to higher energy consumption to reach the set point.

bursts of a couple of hours in the morning and evening. Attempting to replicate this heating pattern with a heat pump is likely to result in higher costs, as heat pumps work most efficiently when providing continuous, gentle heat. It should also be emphasized that this kind of heating regime will likely result in underheating of the home with increased likelihood of damp, mould and condensation and associated health impacts. Therefore, the value proposition focused on a heat pump providing a better standard of heating for less cost than an equivalent gas boiler. In other words the heat pump is better able to deliver “affordable warmth”. The phrase “MORE hours of heat in your home for LESS cost” was adopted to combine heating costs with heating quality and transmit the message that the heat pump would deliver a better heating service for the same or even lower cost than a gas boiler.

1.5. Approach to customer engagement and recruitment

The Clean Heat Streets project pursued a hyperlocal engagement and recruitment strategy that prioritised non-digital forms of engagement tailored to the local community. The strategy was formed based on an initial partner workshop and iterated through focus group engagement with Rose Hill residents. Key principles of the engagement strategy included:

Providing residents with applicable direct experience.

The consortium believed direct experience could help overcome negative perceptions during consumer awareness efforts based on high engagement from a previous heat pump demonstration trailer. This belief was strengthened in early focus groups, where participants raised concerns about the noise emissions of heat pumps and the aesthetics of an outside unit. When participants were invited to a heat pump demonstration trailer that contained all the components of a heat pump system, there were additional questions related to home alterations and practical spatial requirements. This included questions related to the cost and visual impact of larger heat emitters, the proximity of the outside unit to the internal hot water tank, how far the unit can be from the house, and what internal space is required for the hot water cylinder.

Following the sessions, and in collaboration with Rose Hill residents, the concept of ‘heat pump champions’ was proposed; the champions would be heat pump owners within the community who could open their homes so residents can get a first-hand, holistic experience of the heat pump ownership process.

Building trust

While there are benefits of a heat pump, there are also several potential downsides to a heat pump offering. These include the technology being an unknown, the increased capital cost versus a gas boiler, disruption during installation, aesthetic and spatial considerations of the equipment, and different operating schedules. The project identified that residents must trust the offering and the project team to overcome potential reservations. Integrating Clean Heat Streets within existing social networks and trusted relationships was central to the engagement and customer recruitment process.

Personalised, honest support

Despite the relatively small target area, socio-economic mapping during the feasibility stage demonstrated significant demographic differences, including large variations in tenure type, household income, and mean fuel poverty between the two substations being targeted. The project recognised that technical, digital, economic and social capability variations would impact people’s acceptance and

ability to benefit from the Clean Heat Streets offer. For example, fewer households on Courtland Road had a smart meter installed, which was a prerequisite for residents to benefit from time-of-use tariffs and lower operating costs. And low-income and vulnerable groups (more concentrated in Fiennes Road) were less able to afford the heat pump or take the risk of something going wrong during the installation process.

Engagement was personalised to ensure the project team could understand and offer a solution for each resident's circumstances. Clean Heat Streets engagement was designed to be honest and objective, providing residents with the relevant information to make a decision without a hard sell.

In practice, this led to the following features of the engagement:

- 1. Heat pump champions and open homes.** The project created six show homes in the target area, each owned by a heat pump champion. Monthly open-home events were hosted, inviting residents to experience the installation and ask the heat pump champion and project team questions. The project's methodology meant they had to recruit heat pump champions and install heat pumps in show homes before fully engaging with the community. The project, therefore, targeted preliminary engagement towards early adopters who were naturally more receptive to the offer. Integration with the Rose Hill and Iffley Low Carbon group was essential to understand these demographics and recruit willing participants at an early stage when the perception of risk and uncertainty is highest; two of the six show homes were directly from the Rose Hill and Iffley Low Carbon group.

The heat pump champions had different motivations for signing up but were either a) environmentally conscious and driven by the environmental credentials of a heat pump or b) had experience with heat pumps through other people.

Once installed, the show homes were an opportunity to provide other, potentially more hesitant, residents with a first-hand experience of the technology in a local and familiar environment. This consumer segment, often termed the early majority, had different priorities from the early adopters – they needed “social proof” that others in the area were adopting the technology and were more concerned with financial aspects (both upfront and ongoing) than early adopters.

The open days were advertised through leafleting, posters, and word of mouth. However, the project did not collect data to understand how attendees learnt about the event. There were 8 open days held between June 2023 and January 2025, with an average of 18 visitors.

installers. This aimed to create a sense of trust and ownership of the project amongst the local community, build the local supply chain and capabilities related to heat pumps, and support local economic activity.

- 5. Engagement through subgroups.** The project leveraged existing and trusted community links by engaging with residents through established subgroups in the community. This included attending the Rose Hill Junior Youth Club, Asian Women’s Voice (a local group for women, mainly of Pakistani origin), and Rose Hill Community Network meetings. Local news outlets also advertised Clean Heat Streets (Rose Hill News). Owing to the nature of the project, the Rose Hill and Iffley Low Carbon group was particularly engaged, and Clean Heat Streets was regularly included in their correspondence, social media posts, and websites.

The engagement aimed to harness the strong social relations that exist amongst subgroups in a community. It was also valuable in understanding cultural dimensions from different groups within the community. For example, through engagement with Asian Women’s Voice, the project learned that many people of South Asian heritage are reluctant to go completely off-gas because an open flame is preferable in roti-making, often a twice daily activity⁸.

- 6. Participating in community events.** The project hosted several events within the local community to share information about heat pumps and the project. These aimed to build trust in both the initiative and the technology and were frequently held in coordination with the Rose Hill and Iffley Low Carbon group. Events included a Clean Heat Streets launch event (29 April 2023), an Energy Day event (09 December 2023), a project anniversary event (15 June 2024), a Preparing for Winter event (18 September 2024) aimed at helping residents prepare their systems for winter, and a final learning and celebration event (31 January 2025). Project partners considered community events essential for project promotion and trust-building, although their success relies on thorough planning, effective promotion, and an established presence in local activities.

⁸ A heat pump does not impact the ability to operate a gas hob, but households that disconnect completely from the gas main save around £120 per year in standing charges.

Figure 8: Clean Heat Streets advertised on the Rose Hill and Iffley Low Carbon website



The project is run by a consortium of Oxford City Council and County Council, Oxford University, Oxford Brookes University, Samsung, RHILC, SSEN Electricity and other partners. The streets have been selected for the national trial because over the past ten years RHILC has helped Oxford Brookes and the Low Carbon Hub to gather a lot of data on our area. This has shown which substations have the capacity to provide the additional current as people switch from gas to electricity in future.

Website: <http://www.cleanheatstreets.com>



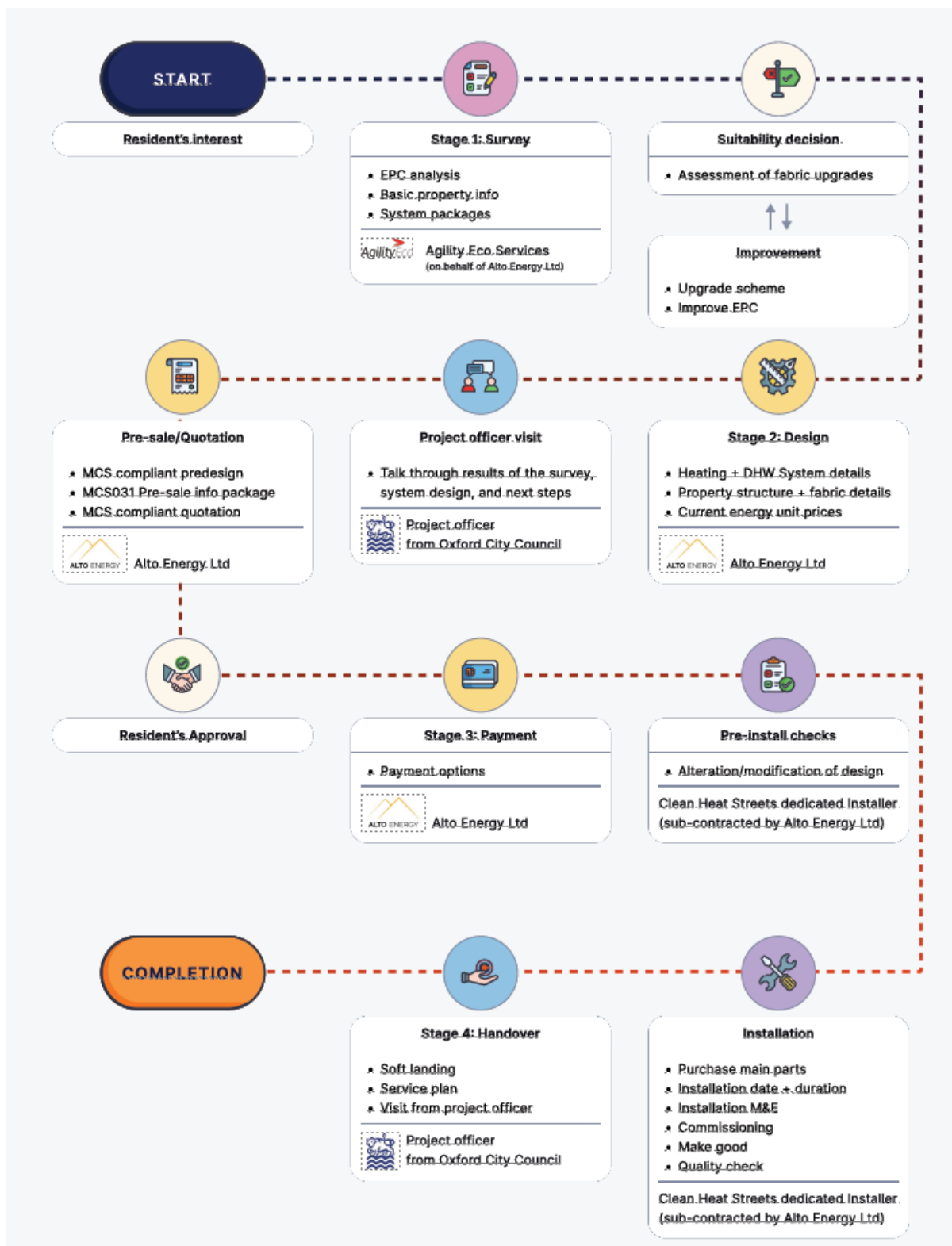
Face-to-face engagement was prioritised to build trust in heat pump technology and the Clean Heat Streets initiative to ensure alignment with community needs. Additional indirect engagement complemented the core efforts, though they were supplementary to more direct mechanisms. This included a dedicated Clean Heat Streets website with FAQs, leafleting (delivered to 1,700 households), use of existing social media channels (e.g., Rose Hill and Iffley Low Carbon Facebook page and WhatsApp group) and advertising materials in local news outlets.

1.6. Proposed customer journey

The Clean Heat Streets project developed a customer journey to take residents from the point of enquiry through to heat pump installation and operation. An Information and Data Management System (IDMS) software solution was developed to manage the information and data flows as residents moved along stages of the consumer journey. The IDMS included a data repository with details of each household, which could be accessed by relevant parties to manage the customer journey effectively.

Each householder could receive at least three hours of in-person contact time across the customer journey. On average, residents who had a heat pump installed had approximately five and a half hours of in-person support from the community engagement officer, with more uncertain residents requiring up to ten hours.

Figure 9: The Clean Heat Streets customer journey



The following stages were followed:

Customer engagement and advice

Residents would become aware of the project through a series of engagement channels, most notably the show home open days, the community survey, local advertising, and word of mouth within the

community. Residents within the target area could register their interest using the dedicated Clean Heat Streets website. At this point, the consumer would be logged in the IDMS.

Pre-installation, survey and design

There were multiple stages between registering interest and installation:

1. **A free heat loss survey** worth approximately £400 was offered to residents who registered their interest. This initial survey provided information about the property's heat efficiency, Energy Performance Certificate (EPC) rating and technical suitability for a heat pump system.
2. **A suitability decision** was made to assess the physical suitability of a home for a heat pump or determine if ancillary improvements were required; about 90% of home were fully capable of supporting heat pumps, 10% needed improvement (namely fabric improvements like insulation), and 1% were unsuitable. If improvements were required, the resident would be supported in delivering the improvements before proceeding with the customer journey. The project encouraged eligible residents to apply for funding from the Great British Insulation Scheme and partnered with OVO Energy to aid the scheme rollout in Rose Hill and Iffley.
3. **An initial design survey** was undertaken to inform the heat pump system design. This gives the resident an overview of various configurations of heat pump sizing, equipment placement, and operating efficiency. This survey also indicated whether additional or larger heat emitters would be required. Capital and operating costs, across various tariff options, could also be provided to the resident at this point. If the resident had a smart meter installed, the IDMS could request access to the smart meter data via the Smart Meter Data partner to improve the cost estimates.
4. The community engagement officer, and sometimes the Samsung project lead, provided an **install visit** following the heat loss and initial design surveys. This was perceived as the most important visit during the customer journey. In it, the householder, supported by the engagement officer, had the opportunity to review the details of the installation plans. Typically, the practicalities and disruption caused by different pipe runs and radiator placements could be discussed. This aimed to accommodate the householder's thoughts and preferences in the install plan and consequently increase the householder's trust and confidence in the process.
5. **A final design configuration and quote** were produced and distributed to the resident for their review. If accepted, the resident would proceed to the installation phase.

Installation and commissioning

A final pre-install check was held before the equipment was procured. The design stage generated standardised schematic diagrams (mechanical and electrical) to provide instructions to the on-site installation team. The schematic diagram was followed by the senior engineer to make sure the installation followed the instructions.

The project engagement officer coordinated the process and facilitated communication between residents and installation teams to minimise inconvenience and ensure smooth scheduling.

Post-installation and quality assurance

A post-installation visit was conducted immediately after commissioning to check the performance of the heat pump system and resident satisfaction. If the heat pump was installed outside of the heating season, a visit focused on hot water operation, with an additional visit planned at the start of the heating

season focusing on space heating. Due to the complexity of the Samsung controllers, 85% of the installations required more than one visit for support with system operation.

2. Project outcomes

2.1 Heat pump installations in Rose Hill and Iffley

The project initially installed six 'show home' heat pumps in the community, acting as 'heat pump champions' to support consumer engagement. Outside of the six show homes, eighteen additional installations were conducted in the target area; eight were funded through Heat Pump Ready and ten received funding through the Boiler Upgrade Scheme where the high-density requirement was ultimately not met in time. Of the eighteen, two were members of the RHILC group.

Under the requirements of the Heat Pump Ready programme, the project needed an agreed number of households within each target area to have accepted a quote before funding was provided for heat pump deployment in that target area, in order to create a high density.

In several cases, the resident wanted to progress to installation before the target area approach allowed, and did not want to wait for a sufficient number of their neighbours to sign up. In these cases, residents progressed through the Clean Heat Streets customer journey, and installed a heat pump at risk – on the understanding that if their target area didn't achieve the density threshold required they could access funding through the Boiler Upgrade Scheme (BUS), outside of the HPR programme. This approach was important to maintain the momentum of installations in the local community and allow residents to progress through the customer journey at their desired pace

As the target areas were defined by substation connections and single streets could be split across multiple substations, there were instances where a resident would fall within the target area, but their neighbour would be outside. To simplify communications the project advertised and offered support at a street-level, rather than a substation-level. All residents that lived on a street included within the Heat Pump Ready substation target areas were therefore eligible for support through Clean Heat Streets. Residents outside of the substation target areas but on eligible streets could not access funding through the Heat Pump Ready programme and instead accessed the equivalent grant funding through the Boiler Upgrade Scheme.

Project activities followed a hyper localised approach, primarily focussed on the Heat Pump Ready target areas. However, many of the activities (including show home open days) reached a wider community beyond the target areas. This resulted in seven installations on eligible streets directly adjacent to the substation target areas, with residents accessing funding through the Boiler Upgrade Scheme.

2.2 Barriers faced during consumer recruitment

The Clean Heat Streets project did not achieve the deployment density target⁹ required by the Heat Pump Ready programme in three of the four target areas. Several barriers are identified that contributed to this:

- Quotes for the total heat pump systems under the Clean Heat Streets initiative ranged from £2,929-£6,863, as shown in Annex 1. This range in pricing reflected the varying sizes and specifications of heat pumps needed for different homes. Even after the £7,500 Government-backed grant, **the upfront capital requirement posed a significant barrier for all income groups**, not just those with low household income. Aside from one show home in a social home, all residents who installed a heat pump under Clean Heat Streets self-financed the installation, with use of the BUS/CHS grant. Many households found it challenging to justify the initial investment partly because, although energy bill savings were likely in most cases, they could not be guaranteed. The project aimed to reduce heat pump running costs through the design, installation, commissioning and handover process, for example helping residents switch to compatible tariffs to benefit from reduced costs without compromising comfort. However, this approach is resource-intensive and not a simple concept that can be easily communicated and understood by many residents. Additionally, the project identified that high annual service charges (over £200 per year) are at least double those of a gas boiler, adding further cost pressure.
- **The project faced challenges engaging with lower-income households and communities with higher levels of social housing and ethnic diversity.** Various reasons were identified for some groups being less engaged: other priorities as a result of living on a low income, cultural reasons including language barriers during engagement phases, split incentives between tenants and landlords, and tenants not wishing to be “demanding” or “troublesome” to their landlord by requesting changes to their heating. Stronger relationships and alignment with the Council’s social housing department team may have helped to overcome some of these barriers.
- **Mixed messaging on retrofit requirements.** Most households surveyed were physically suitable for heat pumps, with sufficiently energy-efficient fabric standards and sufficient space, and about 90% of homes were fully capable of supporting heat pumps, 10% needed improvement, and 1% were unsuitable. High insulation standards weren’t required as the increases in heat pump efficiency (and therefore lower running costs) were not offset by increased upfront costs and disruption entailed by insulation works. However, radiator upgrades were recommended to facilitate lower flow temperatures and heat pump efficiency. Some community members and groups believed that large-scale insulation measures (such as external solid wall insulation) should be a precondition of heat pump installation. This view conflicted with the Clean Heat Street offer, which supported low-cost interventions but found that larger insulation measures for most people were not financially justified and only resulted in marginal gains in heat pump efficiency. It is likely that mixed messaging between the Clean Heats Streets team and alternative retrofit groups increased uncertainty and the perception of risk for some residents.
- **Local planning requirements.** At the time of writing, there was a two-tier system for noise assessment under planning rules. If a heat pump could be installed under permitted development, then a desktop-based MCS noise assessment would be acceptable. This

⁹ See Stream 1 overview document

assessment can be provided as part of the survey so doesn't need additional payment from the customer. However, if the installation does not qualify under permitted development rules, then the local planning team require a noise assessment following BS4142. BS4142 is the UK's principal assessment method for quantifying industrial / commercial noise impact. Because it is generally used in the industrial/commercial sector it costs £1,200 + VAT and is quite an involved process. This creates the strange situation where even if a heat pump is much further away from any neighbours than another installation which gets by on permitted development, it still needs the £1,200 assessment.

- **Prolonged installation lead times.** Feedback from residents indicated prolonged lead times through the survey and design stages. A free, no-obligation heat loss survey was an important component of the value proposition and starting residents on the consumer journey. A higher uptake of surveys was seen compared to projects offering paid surveys. However, it led to lower install conversion rates (approximately 25%) compared to a customer journey with a paid survey, where the customer's willingness to pay indicates a higher level of commitment to the installation process. Despite this, the offer of a free survey ultimately resulted in more installs despite the lower conversion rate than with a paid survey. Smaller installation companies are more sensitive to lower conversion rates and might prioritise paid surveys, leading to longer lead times for those with a free survey. The Clean Heat Streets project partners had little influence over these timescales or mechanisms for recourse in the event of non-compliance.

2.3 What other challenges did the project encounter?

The project noted that there were additional challenges in the following area:

- **Controls and operation.** Many residents found the heat pump control panel hard to operate and the manufacturer's manuals confusing and unclear. This created a pain point for residents immediately after installation, with residents struggling to change set points, operating schedules, etc. The project subsequently developed a simplified version of the guidance to support residents.

2.4 Which aspects of the project worked well?

- **Resident feedback highlighted the importance of the direct, personalised support** offered by the local community officer. Providing the support was resource-intensive (3-10 hours of in-person contact time) but necessary in many cases to address resident hesitancy. The support also allowed resident preferences to be incorporated into the installation process (e.g., equipment placement, radiator sizing) and increased post-installation satisfaction.
- **Peer-to-peer learning** was a successful strategy for community engagement, fostering trust and motivation. In particular, the show home open days were effective in promoting heat pump adoption and personal experience from related champions made a strong impact. It was important that show homes were representative of the wider community and not exclusively show homes that were 'picture perfect' installations. Additionally, the heat pump champions provided an honest account of the realities of a heat pump and, whilst supportive of the project, were not salespeople – they were upfront about any compromises or particular bugbears. This built trust and allowed residents to make an informed decision appropriate for their own circumstances.

Figure 10: Clean Heat Street consortium with Rose Hill and Iffley residents at show home open days



- **Community groups**, notably Rose Hill and Iffley Low Carbon (RHILC) members, became strong advocates for the project and volunteered their time and resources. Integration within the community was fundamental to ensure organic social interactions related to the project and the perception of a trusted offer. For example, heat pump champions provided ad-hoc visits to their homes outside of the open-day schedule. They were also important in establishing sustainable support networks within the community, such as a WhatsApp group for those with a heat pump.
- **HPR funding covered the costs of the heat loss survey**, covering the upfront cost of approximately £400 for the heat loss survey, making it accessible to all residents and encouraging many who otherwise wouldn't have considered it to start their customer journey. This did lead to lower conversion rates (drop-offs were high at 75% compared to the 10% usually experienced by the installer for customers who had paid for a survey), and potentially longer lead times (see above), but was significant in starting conversations and building momentum in the community. Even for residents who did not progress to heat pump installation, the survey provided guidance on how to improve household energy efficiency. A follow-up questionnaire showed the heat loss survey improved the understanding of over 69% of respondents regarding how to reduce their heating bills in the future and 17% had since implemented other energy efficiency measures such as loft insulation. However, the cost of the survey would usually be paid upfront or included in the cost of the heat pump install for the installer to be able to recoup costs for time spent to visit the house, survey and provide a quote. The installer also had less incentive to complete visits, knowing there was less commitment from the customer.
- **The project consortium benefitted from strong collaboration among participants.** The consortium was effectively managed with clearly defined roles and responsibilities, and participants communicated openly and were willing to share resources, knowledge, and expertise. They facilitated efficient delivery and enhanced the consortium's credibility when engaging with residents. The consortium was deliberately structured around collaborative partnerships rather than subcontractors, ensuring that organisations had a common interest in the project's success.
- **The project found high consumer satisfaction with heat pumps;** In post-installation interviews conducted with eight households, most respondents reported a noticeable improvement in the comfort and warmth of their homes after the heat pump installation. This enhancement in comfort contributed to a high level of satisfaction and strengthened their commitment to sustainable living. Participants also appreciated the environmentally friendly nature of the heat pumps, aligning with their values of supporting renewable energy solutions.

2.5 What lessons would the project partners pass on to other organisations looking to deliver neighbourhood-based approaches to high-density heat pump deployment?

- **High upfront costs were a barrier regardless of household circumstances**, particularly when ongoing energy bill savings could not be guaranteed. Organisations should look to keep costs as low as possible to make the offer accessible and attractive. The Clean Heat Streets project identified some areas where costs could be reduced, including the competitive procurement of installers rather than direct award, pre-fabricating external “sheds/plant rooms” with all the equipment and pipework set-up off-site, and some flexibility in heat loss assessments to avoid radiators in expensive locations (e.g. tiled bathrooms or landings with no existing radiator). Some innovative solutions were also suggested by residents, such as a ‘bank’ of used radiators that could be suitable for other households and offering a free MCS-compliant heat loss survey.
- **Offer low-cost finance options**, such as low-interest loans or local authority-backed financing. Even when efforts are made to keep costs low, self-financing the installation may not be possible or desirable for a significant proportion of society. Financing mechanisms should be considered to meet a variety of financial circumstances, including household income, appetite, and ability to take on debt.
- **Focus on achieving high installation standards**. Positive installation experiences are necessary for social proofing to be effective. Additionally, high installation standards are necessary to achieve highly efficient systems and cost savings relative to an efficient gas boiler system.
- **Understand residents’ unique needs and challenges**. The Clean Heat Streets project found significant variations in technical, digital, financial and social capabilities in a small geographic area. A “place-based” approach does not equal a blanket approach, and organisations should work to understand distinctions in opportunities and challenges between groups of people. Enhancing technical skills, providing financial support mechanisms, and addressing scepticism through trusted intermediaries will likely all be required to foster greater adoption of heat pump technology in a given area.
- **Consider cultural dimensions within their engagement strategy**. The Clean Heat Streets project recognised challenges engaging with sections of the Rose Hill community, namely lower-income households and communities with higher levels of social housing and ethnic diversity. Organisations should critically explore assumptions in their engagement strategy and how they interact with the people they’re trying to engage with, for example, using respectful and empathetic language, offering marketing material in multiple languages in an ethnically diverse area, and being aware of religious traditions and celebrations that could impact availability of consumers and overall timelines.
- **Recognise the resource requirement of a place-based approach**. Building trust in the community required a stable and long-term presence in the local area; organisations undertaking a place-based approach should not underestimate the resource requirement of doing so and allocate sufficient resource to on-the-ground presence and relationship building. 1-2-1 engagement was particularly important during the customer journey, with the average customer requiring 5.5 hours of in-person support before making a purchasing decision.
- **Explore how technological innovations can support delivery**. Clean Heat Streets successfully deployed technological solutions to support heat pump delivery, including the IDMS and Samsung SmartThings monitoring and remote control. Organisations should be aware of technological developments and look to adopt innovative solutions to overcome pain points.

This could include, for example, using smart meter data and temperature sensors to minimise time and disruption associated with heat loss calculations.

- **Promote the clear benefits of a heat pump system alongside the financial case.** Alongside possible bill savings, there are multiple benefits of heat pumps compared to a gas boiler. For example, a heat pump is the single most effective and cost-efficient retrofit measure a household can take to reduce its carbon emissions. They are also a healthier way to heat a home and can offer a better heating service for the same or even lower cost than a gas boiler. Organisations should holistically communicate the benefits (and trade-offs) of owning a heat pump during consumer engagement.
- **Adoption of a supportive Time of Use tariffs offers an important route to lower running costs**
- **At current gas and electricity prices Heat Pumps are already operating-cost competitive with older gas boilers and direct electric heating (including storage heating).** Consequently, they are a compelling retrofit option in these circumstances.
- **The economics of heat pump operation are further improved when installed in combination with batteries and solar systems.** This configuration allows optimal use of free or low cost electricity throughout the year via arbitrage and adoption of Time of Use tariffs.
- **Heat pumps can offer an improved standard of heating service for the same operating cost as a gas boiler.** This can make them a suitable option for fuel poor homes which are often underheated with resulting impacts on health and wellbeing. However, installs into very low income homes should be bundled with appropriate insulation measures, lots of support and , Time of Use tariffs as a minimum. Additionally, further complementary measures such solar, batteries and fault detection monitoring systems should be offered if resources permit.

3. Next steps

During the project, the Clean Heat Streets (CHS) team expanded its heat pump offer to those living outside the project's target area, successfully installing heat pumps in 7 homes in nearby streets using the BUS grant.

The team worked with another HPR project, City Science's Home Efficiency Hub Cherwell, and Cosy Homes from Oxfordshire County Council on the Investment Grade Proposals for Portfolio Retrofit project through an [Innovate UK-funded programme](#).

The project, led by the University of Oxford, also developed a methodology enabling SSEN to forecast the changes in demand on individual substation feeders following the installation of a specific number of heat pumps. Using real-world data from the Smart Energy Research Lab (SERL) and Electrification of Heat datasets, energy consumption from houses with and without heat pumps was analysed over a 4.5-year period (January 2019 – June 2024). The analysis allowed the project to generate average daily demand profiles of a substation and estimate how the demand on secondary substations changes with heat pump deployment levels.

- The analysis shows that a substation's load increases by approximately 75% if every connected property directly transitions from non-electric heating to an electric air-source heat pump. These estimates vary depending on the number and types of properties (e.g., detached, semi-detached, terraced) the substation serves. Further analysis showed that homes with cavity or solid wall insulation can reduce heat pump energy consumption by up to 25% during peak operating hours. This demonstrated the potential for insulation measures to reduce the strain on the grid and household energy bills.

- SSEN installed monitoring equipment to assess the actual impact of heat pump installations on the local network.
- The project adjusted default settings at installation to reduce the cumulative impact of heat pumps on the local network. For example, hot water and legionella cycles were scheduled at off-peak times (whilst still meeting householder comfort demands), rather than maintaining the same default time across all heat pumps.

CHS has made a successful bid with Oxford University to the arts festival 'Oxford is Incredible' as a novel engagement strategy. The team are planning a theatrical performance exploring the transition to Net Zero for diverse low-income communities.

The team is continuing to bid for other funding for projects which build on CHS:

- Currently bidding to the National Lottery Climate Action Fund with Oxford City Council as the lead (£1.5 million available over 3 years). There is a plan to replicate CHS' methodology in other cities (e.g. Sheffield, Portsmouth, Brighton, Bristol), starting by working with local community champions to install 6 show homes as social proofing.
- Successful joint bid to UK Research and Innovation (UKRI) with the JED-AI project (justice, energy, demand flexibility and AI for sustainability), exploring using AI to develop the Capability Approach model from CHS for just and sustainable interventions for energy demand flexibility.
- Bidding for funding for other relevant projects including the Economic and Social Research Council's [responsive mode: secondary data analysis](#) – to support research to operationalise the 'capability approach' and to [Horizon Europe](#) on 'Innovative, Community-integrated PV systems'.

The Business Engagement and Social Studies department at the University of Oxford [created a film](#) about Clean Heat Streets to show how the University has worked in partnership with a private enterprise (Samsung) to present a successful project as part of their course. This has been useful for the CHS team to use for their engagement.

Several show homes were part of Oxford Open Doors in September 2024.

The CHS project team has spoken at many events, including:

- the Cleantech Venture Day July 2024, organised by Cambridge Cleantech, Oxfordshire Greentech and Climate Tech Supercluster.
- Oxford County Council's retrofit summit. CHS presented and the project was also mentioned by other speakers in the meeting, including local councillors.
- Oxford University and Oxford Brookes University were invited to present at the European Council for an Energy Efficient Economy ([eceee](#)), and gathered lots of interest, including representatives from California who have a large heat pump roll out.

4. Annex

Details of the properties that installed a heat pump under Clean Heat Streets Heat Pump Ready project:

All homes were semi-detached and build between 1919-1944. All were on adjacent roads in Rose Hill.

ID	Existing heating system	Energy efficiency measures being coordinated by HPR to support install	Number of bedrooms	Number of residents	Cost to consumer for installation
1	Gas boiler	Cavity wall insulation via GBIS	4	2	£2,929.00
2	Gas Boiler	None	3	1	£2,684.66
3	Gas boiler	Cavity wall insulation via GBIS	4	2	£5,349.00
4	Gas boiler	None	3	1	£4,500.00
5	Gas boiler	None	4	4	£6,863.00
6	Gas fire in one room	None	3	1	£10,393.00
7	Gas boiler	None	3	2	£1,013.00
8	Electric heating	None	3	4	£2,684.66