HEAT PUMP READY

Department for Energy Security & Net Zero

Part of the Net Zero Innovation Portfolio

# High-density deployment of heat pumps

**A summary of lessons from the Heat Pump Ready Stream 1 projects**

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Department for Energy Security & Net Zero

CARBON TRUST

Ipsos

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# Contents

# 1. Executive Summary

Stream 1 of the Heat Pump Ready (HPR) programme (June 2022 – March 2025) aimed to achieve high-density heat pump deployment in specific target areas by using innovative, street-by-street methodologies. It aimed to overcome key barriers such as high costs, installation disruption, space needs, and customer scepticism.

The following hypotheses were tested:

1. High-density deployment of heat pumps could unlock economies of scale, reducing installation costs for consumers.
2. A street-by-street approach could overcome widespread barriers to heat pump installation.
3. High-density deployment could simplify the customer journey.
4. High-density deployment could incentivise Distribution Network Operators (DNOs) to identify methods of mitigating the impact of heat pumps on their network and/or create economies of scale for network upgrades.

Heat Pump Ready Stream 1 provided £11.8 million, to 11 projects which explored the feasibility of high-density deployment of heat pumps; 4 of these projects were funded to trial their methodology in practice.

## 1.1. Key Findings

**Finding 1: There can be a gap between whether a home is technically suitable for a heat pump, and whether the consumers are accepting to have one installed, based on the options available at the time of the project.**

Homes within the locations selected by projects were deemed by the project to be technically suitable for a heat pump, in terms of the energy performance of the homes and space availability. However, consumers were still deterred by the upfront and running costs, the disruption caused by in-property changes, and a longer, more complex customer journey compared to replacing a fossil fuel system. While high-density deployment can help (e.g. by improving the customer journey), it did not sufficiently address the individual consumer acceptability of transitioning to a heat pump.

**Finding 2: Most consumers did not see value in proactively paying to transition to a heat pump, where they still had a working heating system.**

Trusted local stakeholders worked to overcome customer scepticism and build awareness, however, most households would only consider replacing their existing heating system when it breaks or is near the end of its life. Many households chose not to engage with these projects because they had relatively new or still functioning boilers. This behaviour is expected to remain a key barrier to high-density heat pump deployment unless other factors drive consumers in that area to transition to a heat pump.

**Finding 3: At the time of the projects, the market may not have mature enough to enable street-by-street coordination.**

Due to unpredictable demand for installs, economies of scale through the supply chain, such as bulk purchasing, are unlikely to result in significant upfront cost savings for the consumer.

It is important to note that since the launch of the Stream 1 programme, there have been technological advancements (e.g. reduced space requirements) which have the potential to overcome some of the acceptability challenges that influenced the main findings from the projects.

## 1.2. Overarching recommendations for future projects looking at high-density deployment of heat pumps.

**Recommendation 1: Prioritise overcoming barriers to consumer acceptance before focusing on high-density deployment.**

Given the above findings of the HPR Stream 1 programme, particularly findings 1 and 2, we recommend that future policy efforts focus on supporting innovation and the development of heat pump products and market offerings to help address current consumer acceptance challenges. These challenges should be sufficiently reduced before government considers significant investment in a high-density retrofit approach to heat pump deployment for the 'able to pay' sector of the market.

**Recommendation 2: Educating consumers about heat pumps before their boiler needs replacing is helpful to facilitating heat pump take up.**

Policy makers should prioritise proactive homeowner education on heat pumps well in advance of the point at which their heating system needs replacing. Project teams found that when consumers are informed ahead of need, they were significantly more likely to consider installing a heat pump when the time comes to replace their existing heating system. Lack of consumer awareness was quoted by project teams as a barrier to uptake.

This approach builds familiarity and understanding of the technology, which helps to make heat pumps a more viable and appealing proposition.

# 2. About

The Heat Pump Ready programme was launched in 2021 as part of the UK Government's £1 billion Net Zero Innovation Portfolio, which funded innovative low-carbon technologies and systems, aiming to decrease the costs of decarbonisation helping enable the UK to end its contribution to climate change.

The Heat Pump Ready programme was structured over 3 streams. Stream 1 developed innovative methodologies to achieve high-density heat pump deployment in target areas. Stream 2 supported the development of innovative tools and technologies to overcome the barriers to heat pump deployment. And finally, Stream 3 focused on collaboration and learning across the Heat Pump Ready programme.

The Heat Pump Ready programme was a Department for Energy Security and Net Zero (DESNZ) programme which aimed to accelerate domestic heat pump adoption in the UK. Funding was provided to 44 projects, targeting a wide range of barriers. These include reducing lifetime costs of domestic heat pumps, improving the customer experience, providing solutions to address the impact on electricity systems, building and strengthening partnerships across the sector, engaging with homeowners and establishing an evidence base to help guide future policy.

This report focusses on projects from Heat Pump Ready Stream 1. Further information on the Heat Pump Ready programme can be found on gov.uk, Heat Pump Ready Programme - GOV.UK.

Stream 1 projects tested innovative ways to reach increased deployment of heat pumps taking a street-by-street approach. The programme provided £11.8 million, to 11 projects which explored the feasibility of high-density deployment; 4 of these projects were funded to trial their methodology in practice. These methodologies were required to use commercially available technologies, whilst predominately targeting owner-occupier and privately rented homes. Further details on the programme and the projects can be found in Appendix 1 (Programme Criteria) and Appendix 2 (Project Information).

Alongside the Heat Pump Ready programme, the Carbon Trust have worked to capture learning from the projects, evaluate their outcomes and share these learnings to wider industry. This report presents the findings from the evaluation activities conducted by Ipsos, in partnership with the Carbon Trust. The methodology for their evaluation is provided in Appendix 5 (Evaluation Methodology Statement for Heat Pump Ready Stream 1).

# 3. Barriers to Heat Pump Deployment

When considering the deployment of heat pumps at high-density, taking a street-by-street approach, there were multiple barriers present across the consumer journey, such as those reported in the Electrification of Heat[1] report, which project teams needed to consider. These included:

- **Upfront cost:** Switching to a heat pump has a higher upfront cost compared to replacing a gas boiler. This is caused by the higher cost of component parts, labour costs and additional property changes required including radiator upgrades and the potential cost of upgrade to 3-phase supply in rare cases. Many consumers may not have the upfront capital available to invest, or access to attractive green finance options, for a heat pump installation.2

- **Running costs:** The cost of operating a heat pump can be higher or lower than a gas boiler due to differences in energy prices, variable system efficiencies once heat pumps are installed, and changes in usage or tariff. Running costs of heat pumps are higher if the systems are poorly designed or operated, such as being set up to run at higher than necessary flow temperatures or taking an on/off approach similar to operating a gas boiler. Operational costs of heat pumps are sensitive to the price of electricity[3]. Higher running costs lead to a less attractive financial proposition of switching to a heat pump.

- **Installation times:** Initial heat pump installations typically take longer than replacing a gas boiler, due to complexity of installation and home suitability. The customer journey to installation can require additional time to find installers and to conduct the initial property survey. There are also potential additional property changes and upgrades identified by the distribution network operator which can cause delays and lengthen the

[1] Electrification of Heat Demonstration Project Summary Report, Energy Systems Catapults, 2024

[2] Estimating the Willingness to pay for a heat pump, Nesta, 2022

[3] Projects were carried out between 2022 – 2025, and do not reflect changes to energy costs announced in the Autumn 2025 budget.

process to installation. This can make the proposition of switching to a heat pump less appealing, especially in distress purchase situations when a boiler is no longer working.

- **Space requirements[4]:** Whilst homes were found to be technically suitable for a heat pump, consumer acceptability varied in terms of using the available space for a heat pump and water tank – both internal and external to the property. Hot water cylinders and other system components can take up the equivalent of a 1m x 1m x 2m cupboard. If the space is not available in the home, this can make the design of a heat pump installation more challenging. It should be noted, however, that innovations are emerging that reduce internal space requirements, for example locating cylinders outside the home.

- **Home disruption[4]:** The level of home disruption involved during installation can be too high to be acceptable to some consumers. Heat pump installations can involve substantial remedial work in the property (e.g., pipework replacement or radiator upgrades), which can result in the useability of the property being greatly reduced while the installation is taking place. The recent increase in the availability of higher temperature heat pumps can reduce the need for more significant remedial work and associated disruption, however.

- **Misinformation:** There is significant misinformation around heat pumps in the public domain. This leads to some consumers incorrectly assuming a heat pump is not suitable for their home.[5]

- **Consumer perception:** consumers have a lack of familiarity with heat pump technologies and installers. This includes misconceptions and word-of-mouth anecdotes of negative experiences, as well as general scepticism when a technology is new and unfamiliar.

[4] Since the launch of HPR Stream 1, there have been advances in technologies available, such as innovation tools and technologies developed through Heat Pump Ready Stream 2, which reduce space requirements and disruption to homes, thus increasing the acceptability of heat pumps to consumers.

[5] Written Evidence from Which? (BUS0005), 2021

# 4. Hypotheses of Stream 1 of the Heat Pump Ready Programme

Heat Pump Ready Stream 1 aimed to test whether installing heat pumps at high density, using a street-by-street approach, could help overcome the key barriers described above. Throughout the delivery of the project, evaluation of the projects was carried out to collect learnings which were gathered against the following 4 hypotheses:

1. **High-density deployment of heat pumps could unlock economies of scale benefits, reducing installation costs for consumers**

High-density deployment of heat pumps aimed to reduce the upfront costs to consumers by creating efficiencies in the survey and design process and engaging with local supply chains.

2. **A street-by-street approach could overcome widespread barriers to heat pump installation**

A street-by-street approach, which targets consumers within a given geographical location, aimed to overcome barriers to heat pump uptake by overcoming consumer scepticism through engagement with the local community and leveraging the formal and informal networks between residents.

3. **High-density deployment could simplify the customer journey**

High-density deployment aimed to simplify the customer journey by enabling multiple installs in houses with a similar architype. The development of one-stop-shop approaches and digital platforms could provide a streamlined service, providing support from initial interest to post-installation by offering everything in one place.

4. **While high-density deployment may negatively impact electricity networks, it could allow Distribution Network Operators (DNOs) to identify methods of mitigating the impact of heat pumps on their network and/or create economies of scale for network upgrades.**

Achieving high-density deployment of heat pumps may present challenges to the electricity networks but provide economies of scale to upgrades to DNOs. This was monitored by working closely with DNOs throughout the programme.

These hypotheses are summarised below in Table 1, mapped alongside which of the technological and consumer barriers that were aimed to overcome through delivery of the programme.

*Table 1: Summary of barriers each hypothesis aimed to overcome during the programme*

| Barrier | Hypothesis 1: Economies of Scale | Hypothesis 2: Street-by-street approach | Hypothesis 3: Simplification of the customer journey | Hypothesis 4: Electricity networks and DNOs |
|---|---|---|---|---|
| **Upfront cost** | ✓ | | | ✓ |
| **Running costs** | | | | |
| **Longer installation times** | ✓ | ✓ | ✓ | ✓ |
| **Space requirements** | | | | |
| **Home disruption** | | | | |
| **Consumer awareness** | | ✓ | ✓ | |
| **Consumer scepticism** | | ✓ | ✓ | |
| **Complex customer journey** | | | ✓ | |

# 5. Programme outcomes: Were the hypotheses confirmed, and can high-density deployment overcome the barrier?

This section draws upon learnings collated through the independent evaluation (Details in Appendix 5) of the 11 projects funded through HPR Stream 1 – Phase 1: Feasibility (Details in Appendix 3) and 4 projects funded through HPR Stream 1 – Phase 2: Delivery (Details in Appendix 4). This evaluation provided key insights into the challenges and opportunities for high-density street-by-street heat pump adoption.

Each of the project teams developed their own deployment methodology and defined the streets which they were targeting for deployment (target groups) as part of their feasibility study. Across all 4 projects, a total of 2,493 homes were targeted with the ambition to deploy 624 heat pumps. For projects to proceed to deploying heat pumps within a target area, they were required to evidence to the Department that 25% of consumers within that target area had accepted a quote for their heat pump.

Projects adopted different approaches to selecting their target areas; some projects chose a series of target areas with a similar number of homes, whereas other projects chose a series of target areas with an increasing number of homes (Details in Appendix 4). Table 2 shows the deployment targets and figures achieved in each project.

The projects found challenges in consumer recruitment and ability to scale their consumer proposition. This was due to a number of factors, including the perceived high cost of heat pumps, limited installer expertise within the targeted location, limitations of the electricity network, consumer scepticism and lack of motivation for consumers to replace still functioning heating systems. Despite this, useful strategies to encourage high density deployment were identified, such as localised outreach, coordination methods with electricity network operators, affordable financing options, and combining heat pumps with solar panels to lower long-term costs.

*Table 2: Total number of houses within the target areas of each project, and the total number of heat pumps deployed through the Heat Pump Ready Programme*

| Project | Location | Project Lead | Total Number of houses in target areas | Total number of consumers required to achieve 25% deployment level | Actual Number of Heat Pumps Deployed in target areas |
|---|---|---|---|---|---|
| **Clean Heat Streets** | Oxford | Samsung | 600 | 150 | 8 |
| **Bristol Heat Pump Ready** | Bristol | Bristol City Council | 802 | 201 | 0 |
| **Heat Pumps for Friday Bridge** | Fenland (Cambridgeshire) | City Science | 576 | 144 | 0 |
| **Home Efficiency Hub** | Cherwell (Oxfordshire) | City Science | 515 | 129 | 0 |

This section takes each of hypotheses set out in Section 4 and considers the learnings gained from the projects which support or oppose the hypotheses.

## 5.1. Hypothesis 1 - Economies of scale

The number of heat pump installations completed during the programme were not sufficient to conclusively prove or disprove this hypothesis, however the projects teams gained significant learnings in this area. Learnings from consumer recruitment, including difficulty in identifying and confirming sufficient customer demand, is further discussed in section 5.3.

### Key barriers identified for economies of scale before consumer recruitment or deployment

There were several barriers identified by project teams in the feasibility phase which indicated that it would not be possible to achieve economies of scale within their chosen target area, including:

- **Low consumer willingness to replace working gas boilers**
  In projects like Leeds RHINOS, consumer research showed that many homeowners

were unwilling to switch to a heat pump unless their gas boiler failed. Without stronger incentives, voluntary adoption remained low.

### Financial barriers and the competitive landscape

- Despite projects offering financial incentives such as low interest loans and bundled electricity tariffs, **affordability was cited by project partners as a major obstacle** to heat pump uptake in all projects.

- **Upfront costs were cited as the major deterrent** in all projects. However, customers were also **sceptical of the potential longer-term savings** that heat pumps could deliver, with customers in Fenland and Cherwell highlighting uncertainty about future savings, even when combined with solar PV and time of use tariffs.

- **Uncompetitive financial offers**: Home Efficiency Hub Cherwell found that its heat pump proposition was less attractive than heat pump offers that were readily available on the market (e.g. heat pump and solar PV packages offered by energy suppliers). This highlights a potential challenge for new projects in local areas being competitive with established national brands.

- Projects hoped **to generate economies of scale leading** to reduced up-front costs for consumers, however the low levels of uptake meant that these discounts did not materialise.

- It was found by Oxford Clean Heat Streets that households with a **higher disposable income** were more likely to proceed with installation. The value proposition had a strong focus on the **environmental benefits**, rather than reduction of costs.

### Learnings from the feasibility studies

- **High upfront costs as a major barrier to heat pump adoption**
  Even with subsidies, most projects identified **affordability concerns** as a primary deterrent for consumers. Various financing solutions were explored through market engagement and consumer research, but finances remained a primary barrier to heat pump adoption at the required scale (PACE Cambridgeshire, Leeds RHINOS, Newcastle, Gaia).

- **A key barrier identified in the feasibility stage was uncertainty around financing and returns on investment**

Financial institutions were reluctant to invest in Heat as a Service (HaaS) models due to a lack of long-term performance data, while PACE financing was deemed unviable in the UK due to regulatory barriers (Newcastle, PACE Cambridgeshire).

## 5.2. Hypothesis 2 - A street-by-street approach

Learnings from Heat Pump Ready Stream 1 provided some evidence for this hypothesis to be correct, with learnings on barriers and solutions discussed in this section.

The customer journey taken by homeowners during the Heat Pump Ready programme has been mapped, shown in Figure 1, including common drop-out points.

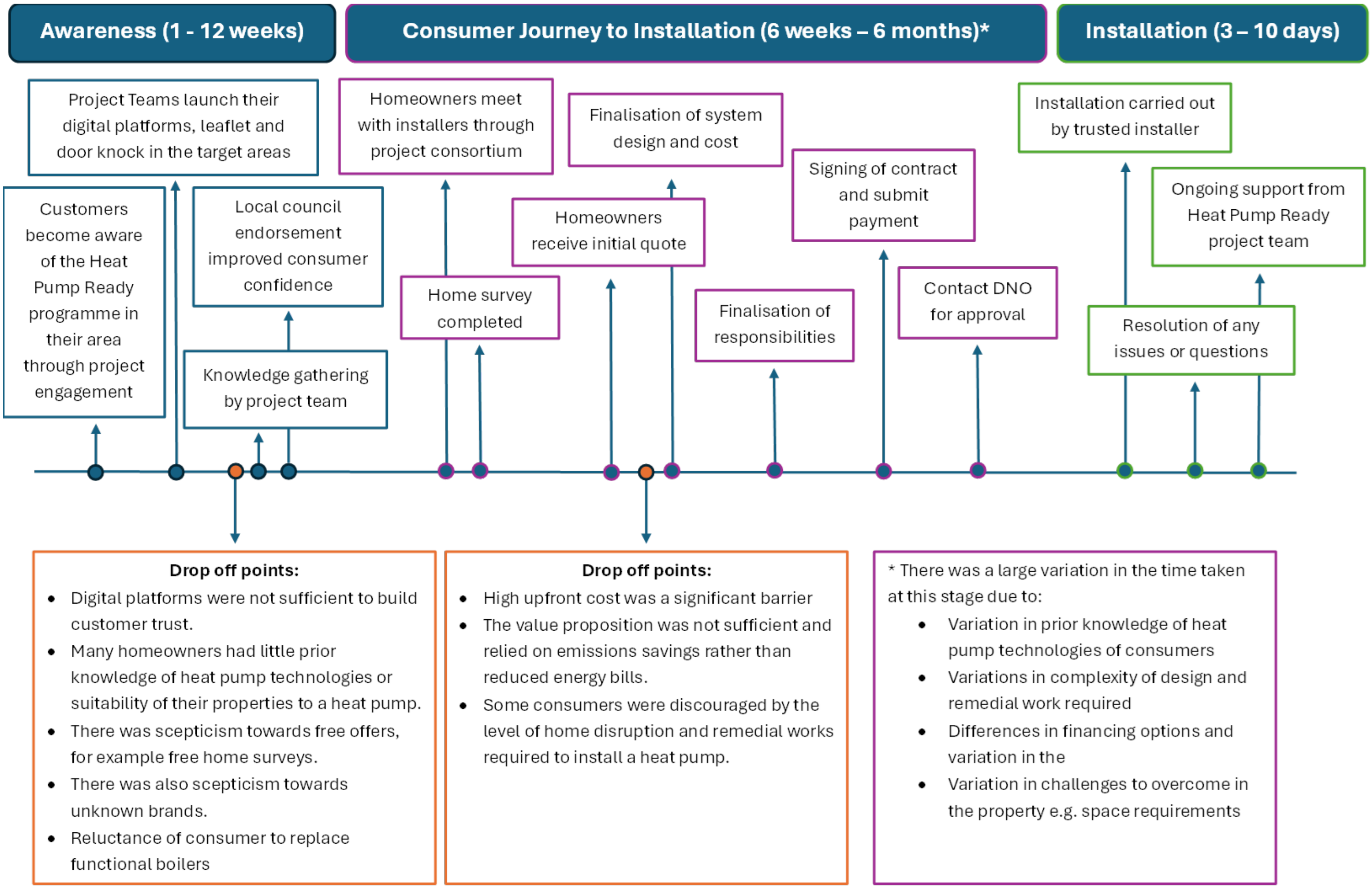


*Figure 1: Map of the customer journey followed by Heat Pump Ready projects including drop off point learnings*

### Supply chain and installer challenges

- Projects reported facing **challenges in procuring installers to undertake installations**. In Cherwell, the tender process did not result in the successful appointment of any installers and the project instead relied on existing supplier relationships held by project partner, the National Energy Foundation. Similarly, the Fenland project faced challenges in achieving enough tender responses and switched their response to use the local authority framework to appoint their installer.

- In the Oxford Clean Heat Streets project the **uncertainty in number of installs to be carried out was a challenge**. This issue was less acute compared to other projects as an installer, Alto Energy, were engaged as a core project partner, responsible for survey, design, installation and aftercare. Nevertheless, the project still reported challenges in engaging with local installers to form part of the installer workforce due to the uncertainty at the beginning of the project on number of installs.

- **Innovative approaches to engaging installers were successful but uncertainty over consumer demand made it difficult to keep them engaged.** In Bristol, significant efforts were made to recruit and train local installers through social events (for example in a local brewery), a WhatsApp group and free training sessions. However, the project found it challenging to maintain installer engagement as consumer demand failed to materialise. Similarly, in the Fenland project, delays to the delivery of home energy surveys led to challenges with keeping the installation partner engaged.

- **Variations in costs to install a heat pump system can be confusing for homeowners.** Bristol aimed to set a fair price for both installers and homeowners by creating a rate card stipulating the costs to be used by all installers in their scheme. The intention was to compare quotes for an example property, so that The Green Register (TGR) could align costs, installers could agree on a set rate and Bristol Heat Pump Ready (BHPR) could maintain a high standard of installation. However, installers in the scheme felt that having a rate card was not achievable or practical due to the variety of homes included on the project and the differences in installers' buying power and outgoings.

- **Projects had varying approaches to quality assurance**. In the Cherwell project, the Trustmark quality assurance framework was specified in the procurement exercise for installers. However, the project partners reported that this may have inadvertently discouraged smaller installers from participating due to the additional administrative burden. In Oxford Clean Heat Streets, additional

Quality Assurance measures were included through the provision of post-installation support from the installer, and ongoing monitoring of the heat pump. The Bristol project planned to install metering to enable ongoing monitoring of the heat pump system, allowing both installer and customer to keep track of the performance of their heat pump as a way to give high quality installs.

## 5.3. Hypothesis 3 - Simplifying the customer journey

Learnings from the Heat Pump Ready programme provided some evidence to support this hypothesis. Learnings of the barriers faced and solutions from the project are discussed in this section.

- A key feature of all projects was the **‘One Stop Shop’ model**, designed to simplify the heat pump adoption process by providing integrated advice, technical support, installation and financing in a coherent package for the customer. The ‘One Stop Shop’ is a streamlined model which provides information to support the customer from initial interest through to post-installation in one place.

- However, projects reported that some **consumers remained confused about the customer journey to adopt a heat pump.** Despite the centralised support offered in Cherwell, Bristol, and Fenland, project partners reported that many consumers still found the process complex, with some uncertain about financing options and installation logistics. Oxford Clean Heat Streets found that a dedicated project officer and significant in-person support from the manufacturer, Samsung, was necessary to guide homeowners through the one stop shop process. Anecdotally, consumers valued being able to speak face to face to a knowledgeable member of the project team, and found them quick to respond to emails, calls and text messages. However, it was noted that this approach is highly resource intensive, involving a full-time member of staff for the duration of the process.

- Projects that offered wider support for **‘whole house’ energy improvements** were able to educate consumers of the measures they could undertake to support a heat pump installation. By providing whole house survey reports rather than focused heat pump reports, the Cherwell project gave context to the heat pump costs and explained the additional elements that would improve the heat pump performance such as insulation and radiator upgrades or improve cost paybacks such as PV arrays. The Oxford project worked with other government funded schemes to help homeowners get insulation installed along with their heat pump.

### Consumer engagement and recruitment

Solutions related to consumer engagement and recruitment:

- **Face-to-face engagement was critical to generating initial interest in the projects:** Bristol Heat Pump Ready and Oxford Clean Heat Streets found that door-knocking and in-person events were far more effective than digital marketing at generating interest. The Cherwell project found that a digitally focussed engagement strategy generated high level of awareness of the project in the target area (90%) but struggled to convert this awareness into interest in the free home surveys. The Cherwell project re-focussed its engagement strategy during the project to involve more face-to-face engagement which was seen to raise consumer interest. However, all projects found that converting interest into signed-up customers was challenging.

- **Community-led engagement was most effective at persuading customers to install heat pumps, particularly where it allowed residents to see heat pumps in action.** The Oxford Clean Heat Streets project used local champions and open home events and found that these were particularly effective at overcoming consumer scepticism in heat pump technology and gaining customer confidence in the Clean Heat Streets proposition. This approach helped provide social proof by allowing residents to see heat pumps in action. The failure of the Heat Pumps for Friday Bridge project to successfully deliver a demonstration home was cited by project partners as a key reason for failing to convince the local population to install heat pumps.

- **The involvement or endorsement of the local authority contributed to higher levels of confidence in the service offering**. Part way through, the Cherwell project added local authority branding and endorsement in the 'Home Efficiency Hub', after which they reported higher levels of consumer confidence. The Fenland project used Cambridgeshire County Council's existing Action on Energy brand in their logo design and clearly showed the endorsement from both Cambridgeshire County Council and Fenland District Council in all marketing and communications to residents.

Barriers related to consumer engagement and recruitment identified in the Heat Pump Ready programme:

- **Consumers were less likely to consider switching to a heat pump if their boiler is new or still functional:** There was no programme requirement on the age of boiler or current heating system to participate. Oxford's Clean Heat Streets found that over 50% of boilers in the target area were 8 years old or newer. Whilst the projects did not necessarily collect specific evidence on this, we anticipate that having a newer and working heating system was one of the main reasons why projects achieved lower than expected engagement rates and low household recruitment (with three projects failing to achieve their recruitment threshold).

- **Overcoming consumer scepticism was challenging:** A key barrier across all projects was **consumer trust and confidence in heat pumps**. Many homeowners were unfamiliar with the technology, sceptical about its benefits, or concerned about installation disruptions.

- **Free offers and unknown brands were met with scepticism:** Both the **Heat Pumps for Friday Bridge** and **Home Efficiency Hub Cherwell** projects reported a high level of scepticism from homeowners about the motivations of the projects when offering free home surveys and even a select number of free heat pump installations. In the Cherwell project, project partners felt that the lack of a track record of the 'Home Efficiency Hub' brand (developed by City Science for this project) contributed to a lack of confidence from the local community. Clean Heat Streets also a new brand, overcame the consumer scepticism by creating an identifiable and recognisable brand in the local area, which leveraged its affiliation with trusted local entities such as Oxford City Council, Oxfordshire County Council, Oxford University and Oxford Brookes University.

- **There was a considerable variation in consumer timelines:** There was a large variation in time spent by consumers on information gathering and decision making due to different levels of prior awareness of heat pumps. The methodologies developed under the programme did not enable the alignment of these journeys to optimise the benefits of a street-by-street approach.

- **Technological barriers remain in place which cannot be overcome by a street-by street approach:** Barriers including upfront costs, running costs, space requirements and home disruption were quoted by project teams as to why consumers did not engage with the programme, or did not proceed to installation after receiving a quote. Oxford's Clean Heat Streets cited that the increased capital cost versus a gas boiler, and disruption during installation, must be overcome to build consumer confidence, with some households dropping out of the process once the scale and cost of these additional aspects (e.g. pipework replacement and radiators upgraded) became clear.

## 5.4. Hypothesis 4 - Electricity networks and DNOs

The number of heat pumps installed during the HPR process was not sufficient to prove or disprove this hypothesis, however project teams worked closely with DNOs.

This section details learnings from the programme related to grid capacity and network constraints.

- The high-density deployment feasibility studies identified that grid capacity was a key risk for high-density deployment. However, this risk did not materialise for the delivery phase projects where **grid capacity was generally not a limiting factor** for heat pump deployment. This was due to the areas chosen for delivery being known to have sufficient headroom for increased electricity demand and ultimately, low numbers of heat pumps being installed.

- **Grid data issues still delayed planning:** For example, **Cherwell and Oxford** found that a **lack of early certainty on heat pump specifications** and network capacity created challenges for grid planning, even when capacity was available. Bristol struggled to obtain relevant property level information, such as which properties were connected to which low voltage sub-stations, from the Distribution Network Operator during the delivery of their project.

- The low numbers of heat pumps that were installed meant that projects were unable to provide data or learnings on the prevalence or impact of other network issues (e.g., fuse upgrades, looped properties) that can add time and complexity to the heat pump installation journey where these issues need to be rectified.

### Learning from the feasibility studies

- **The importance of early engagement with Distribution Network Operators (DNOs)**
  Many projects faced challenges related to grid constraints and lack of detailed property-to-substation mapping data. Early engagement with DNOs was found to be essential to secure necessary data, understand network limitations, and ensure proactive grid reinforcement planning (Newcastle, Oxford, Bridgend, Greenwich TIME). This data was needed in order to satisfy a particular requirement of the Heat Pump Ready programme, i.e. to identify low voltage sub-stations where 25% of homes could install heat pumps. However, the lack of detailed property to sub-station mapping data does highlight a potential issue for future high-density deployment projects.

- **A key barrier identified in the feasibility phase was grid constraints and lack of substation-level data**
  Many projects struggled to access accurate local grid capacity data. In Newcastle, 37% of substations were lacking detailed mapping data. This posed a risk to deployment feasibility and increased uncertainty in project planning (Newcastle, Oxford, Greenwich TIME).

# 6. Other programme learnings

There are additional areas where the programme achieved learnings outside of the hypothesised areas. These learnings are presented in this section.

## 6.1. Common themes across the feasibility studies

Several recurring themes emerged from the studies:

- There is a need for supply chain scaling and installer training.
  Several feasibility studies identified insufficient accredited heat pump installers, which could constrain large-scale deployment. Projects like Utilita, Bridgend, and Bristol developed training programs and supplier hubs to expand the local workforce.

- Project teams aimed to bundle heat pumps with other low-carbon technologies.
  Several projects found that heat pumps alone were not financially attractive to consumers, but when bundled with solar PV and battery storage, payback periods improved significantly (Gaia, SAPPHIRE Solo, Cherwell).

## 6.2. Project governance and partnerships

- All projects built **strong partnerships** among their core consortium, with well-defined roles to facilitate collaboration. This structure was required to enable scalability of the innovative methodologies, provide effective overall solutions to consumers and to overcome consumer scepticism through consistency.

- The use of **data sharing tools**, including Customer Relationship Management (CRM) in Cherwell and Integrated Data Management System (IDMS) in Oxford, allowed for efficient sharing of information between key project partners. However, Heat Pumps for Friday Bridge and Bristol Heat Pump Ready experienced communication challenges which led to a hindered project flow. An agile and consistent approach is required for governance in data sharing across the consortium.

- Clean Heat Streets developed a **strong internal governance** framework, with regular meetings held in person, weekly catch-ups which included risk management, monthly meetings with monitoring officers and quarterly meetings with the Department. The governance processes in place were effective in decision making and remained unchanged throughout the project.

## 6.3. Digital platforms

- All projects in the Heat Pump Ready programme built **bespoke digital platforms for their project with the aim of simplifying the consumer journey.** At a minimum, these aimed to generate initial interest and allow consumers to register their interest. Some platforms were extended into more complete CRM systems, hosting all documentation required of the consumer (e.g. home surveys, quotes, aftercare guides) and enabling access to all parties involved in elements of the consumer journey (e.g. community liaison officer, system designer, installer).

- It was found the digital platforms were **not sufficient to overcome consumer scepticism**, with projects finding face-to-face interactions such as door knocking, leafleting, open days and show homes more effective. Although digital platforms were not entirely sufficient, online presence was needed to provide credibility to the face-to-face interactions.

# 7. Concluding findings and recommendations

## 7.1. Summary of Barriers the Hypotheses Targeted to Overcome

Table *4* maps the hypotheses of the Heat Pump Ready Stream 1 programme against the technological and consumer barriers to heat pump deployment. This shows which, if any, of the barriers each hypothesis was able to overcome.

*Table 3: Map of barriers aimed to overcome by each programme hypothesis*

| Barrier | Hypothesis 1: Economies of Scale | Hypothesis 2: Street-by-street approach | Hypothesis 3: Simplification of the customer journey | Hypothesis 4: Electricity networks and DNOs |
|---|---|---|---|---|
| **Upfront cost** | √* | | | X* |
| **Running costs** | | | | |
| **Longer installation times** | | √‡ | √‡ | X* |
| **Space requirements** | | | | |
| **Home disruption** | | | | |
| **Consumer awareness** | | √ | √ | |
| **Consumer scepticism** | | √ | √ | |
| **Complex customer journey** | | | √ | |

**Key:**

√*Innovative methodologies developed by project teams aimed to deliver economies of scale, however installation numbers were not sufficient to realise these anticipated benefits.

‡ A street-by-street approach had the potential to reduce the time and complexity of some elements of the installation journey (e.g., through guiding consumers through the journey as a cohort and providing ready access to trusted installers), however this approach was not able to fully overcome this barrier.

X* it was anticipated that high-density deployment would realise benefits for electricity networks and DNOs in overcoming upfront cost and longer installation times through economies of scale benefits of network upgrades. These were not realised through the programme due to the low number of installations.

## 7.2. Key lessons for future high-density deployment

The delivery phase projects revealed several critical insights for improving future high-density heat pump adoption efforts:

### Extensive engagement and high visibility are required to build confidence in the offer

- Large-scale uptake requires **extensive engagement, trusted local champions, and visible early adopters**. Projects saw increased engagement through using a **hyper-localised approach** and utilising existing community networks.

- **Oxford's Clean Heat Streets** achieved increased engagement, awareness and confidence by partnering with a local low carbon group, which is well established and positively thought of within the area.

- Project teams also achieved increased consumer confidence in the offer and brand through **local council endorsement**.

- There was a **large range in duration of consumer timelines** due to variations in prior awareness, knowledge gathering and time required for decision making. The average time from a customer registering to the install being complete in the Oxford project was six and a half months, with the quickest moving through in just under two months. At the commencement of the project, some consumers were further along the heat pump journey than others, which should be factored in when planning a high-density and localised deployment approach.

- **Oxford's 'Heat Pump Champions' and Open Home events** were particularly effective in improving consumer confidence. Initial installations by Clean Heat Streets acted as show-homes. These residents advocated for heat pumps within their community and could answer residents' questions, which was seen to help to drive increased adoption. Consumers specifically valued the opportunity to view heat pumps in show homes of a similar architype to their own house, and a similar model of heat pump.

- Despite installation numbers being lower than targeted, place-based deployment brought consumers further along the journey than they would have been otherwise. This is important as these homeowners will be more likely to consider a heat pump when upgrading their heating system in future.

- In some areas, extensive engagement was able to overcome the key barriers of **customer awareness and scepticism**.

### Face-to-face engagement was far more effective than digital outreach

- **Oxford and Bristol** demonstrated that **door-knocking and in-person events** were the best ways to engage consumers. **Clean Heat Streets in Oxford** particularly benefitted from having a **dedicated resource from the local council** to support with consumer engagement.

- **Passive digital marketing alone was not sufficient** to drive uptake but does play a role in the customer journey. In Oxford's Clean Heat Streets, consumer confidence was built through face-to-face engagement, with an online presence providing validation.

- Future projects should **focus on trusted local brands and avoid purely online-based approaches**.

### Financial offers must be competitive and well-communicated

- Customers compared project financing with **alternative heat pump offers from across the market** and often found other options more appealing, such as heat pump and solar PV offers from energy suppliers.

- Financial messages should be **clear and consistent**—in Cherwell, **mixed messages on loan terms led to consumer confusion**.

- Project teams could not overcome the key barriers of **upfront cost and running costs,** which remain a high priority for consumers. This challenge was even greater for households with new, or still fully functional, boilers or existing heating systems.

### Supply chain readiness is essential

- **Limited installer availability and procurement delays impacted delivery**. Future projects should **ensure early engagement with suppliers and pre-approved installer networks or incorporate an installer organisation as part**

**of their core project team** to enable greater levels of project certainty to be in place prior to engaging consumers.

- Highlighting the **consumer protections** that were in place as part of these projects, such as quality assurance frameworks (e.g., PAS 2035 and MCS compliance) can **reduce consumer risk perception and offer easily accessible and timely resolution pathways** when issues arise.

- **Delays in the supply chain** can result in **longer installation times**. The innovative methodologies developed by the project teams could not fully overcome the **complex customer journey and consumer scepticism** in the supply chain.

- **Installers holding positive views on heat pump technologies is important** as they can act as advocates. Consumers value the advice of the installers, and it is therefore essential they positively recommend the technologies to homeowners.

- An additional challenge for the supply chain was **lack of guarantee of installation numbers** within the programme, which created uncertainty.

### Grid constraints were less of a barrier than expected

- While feasibility studies flagged **potential grid constraints**, where heat pumps were installed, **grid capacity was found to be sufficient,** however low numbers of heat pumps were installed**.**

- All projects reported that **early engagement with Distribution Network Operators (DNOs) remains important** for planning high-density heat pump deployment programmes.

- DNO engagement was limited to localised areas and low number of installs. Furthermore, one of the selection criteria for the target areas in these projects was that there was sufficient capacity on the local network. There are other network issues that cause delays which were encountered by the project teams (e.g., needing fuse upgrades or looped properties).

### The 'One Stop Shop' model needs further refinement

- Consumers still found the process **complex**, suggesting a need for a **more streamlined and proactive customer journey**.

- There is scope for a heat pump one stop shop offer to be included in, or to include, related whole house energy measures such as insulation and solar PV.

- Despite technology competence of homeowners, **digital platforms were not sufficient** alone to overcome scepticism.
- The barriers of **complex customer journey** and **consumer scepticism** remain challenging to overcome.

### Consumers are reluctant to replace new or working heating systems

- Consumers with new, or still functional, heating systems were less likely to engage with the project.
- **All barriers** to deployment contribute to this.

### Technological barriers to heat pump deployment remain prevalent

- **High-density approaches can only overcome a subset of barriers** to heat pump deployment. Of those, projects did not fully overcome the relevant barriers sufficiently to overcome remaining technological barriers which influence consumers' acceptance of the technology.
- There are **remaining technological barriers** which high-density deployment and place-based approach cannot overcome as they are specific to individual consumer needs and preferences, for example allocating space within their home for a hot water tank.
- Technological barriers remaining include **upfront costs of heat pump unit purchase, running costs, space requirements and home disruption.** All projects reported that not being able to guarantee a reduction in running costs was a barrier. Several consumers in Oxford's Clean Heat Streets project received a quote, however, did not continue to installation due to one or more of the technological barriers described above – this was deemed to be due to the acceptability of the technology to the consumer, as opposed to the homes not being technically suitable for a heat pump installation.
- Since the launch of the Stream 1, there has been the commercialisation of innovative products which increase the consumer acceptability of heat pumps, further details of these can be found in Heat Pump Ready Stream 2's thematic reports[6].

[6] Heat Pump Ready Programme: Stream 3 programme outputs - GOV.UK

## 7.3. Broader Lessons Beyond the Programme Hypotheses

The feasibility studies identified useful lessons for those planning future neighbourhood-based heat pump deployment projects including:

**1. Craft clear and simple messaging:** To strengthen consumer awareness and confidence, ensure your messaging is clear and straightforward. Consumers need access to trusted advice from local community organisations. Peer advocacy, where homeowners with heat pumps share their experiences, is a powerful motivator for adoption, as found by Newcastle, Leeds, and Oxford.

**2. Develop flexible financing models:** Address the major deterrent of upfront costs by offering flexible financing options including models such as green mortgages, local authority backed loans and longer-term personal loans.

**3. Address workforce shortages:** Large-scale heat pump deployment requires a significant expansion of installer training programs. Collaboration with local colleges and industry may be helpful to develop a robust supply chain, as identified by the Utilita, Bridgend, and Bristol projects.

**4. Prioritise areas where heat pumps are most feasible:** Many projects sought to target thermally efficient homes (less likely to require thermal fabric or radiator upgrades), or those that already have solar PV (indicating a higher propensity to invest in clean home energy technology), or clusters of similar housing to reduce installation complexity. It is also important to engage with DNOs to prioritise areas with sufficient grid capacity to avoid costly reinforcement delays, as done in Oxford, Bristol, and SAPPHIRE Solo.

**5. Optimise installation models for scale**: Standardise survey, design, and installation processes has potential to lower costs and improve customer experience. Group purchasing and coordinated installation programs could reduce costs by up to 10%, once the market has developed, to make heat pumps more attractive to consumers, as found by Utilita, Newcastle, Bridgend, and Oxford.

## 7.4. Recommendations and Implications for Future Policy

1. The **technological barriers,** which impact the acceptability of a heat pump to consumers (see Hypotheses to barriers mapping in section 7) are still the limiting factor to widespread heat pump adoption, **rather than the type of rollout approach** (high-density or individual household level) that is taken. Furthermore, these barriers cannot in of themselves be overcome solely via adopting a high-density deployment approach. We therefore recommend that future policy focuses on **supporting innovation and enabling the market to develop** such that these technical barriers are overcome or removed to enough of a degree that they are no longer the limiting factors, before government commits to/invests in high density deployment for retrofit properties within the 'able to pay' sector of the market.

2. The majority of **consumers do not and will not replace their heating system unless their existing system breaks down** or is reaching the end of its life. Given the average lifespan of a gas boiler is c.15 years, there would likely be only a **relatively small proportion of households that would entertain the idea of replacing their heating system** within an area that is being targeted for high-density deployment as there will be a range of heating systems of varying ages. This means that **households would likely require additional incentives** and/or support to persuade them to replace their existing working heating system with a heat pump.

3. Projects that used hyper-local, pro-heat pump engagement were the most successful. They involved **trusted local figures**, such as community group members, Local Authorities, and visible early adopters. Specifically, this approach successfully moved consumers within the target areas further along the 'heat pump installation' journey than they would have been otherwise. The high levels of trust and familiarity inherent within these approaches raised awareness, corrected misconceptions, and reduced scepticism about heat pumps. Elements of these successful approaches can be scaled to regional or national campaigns. Key approaches include using trusted local endorsements, tailoring messages to local populations and housing types, and signposting local resources. These steps **help consumers feel more comfortable with heat pumps as a technology** and more likely to install one when replacing their heating system.

4. One of the most successful aspects of these projects was **having a dedicated person, such as a low carbon officer from the Local Authority**, who could spend time in consumer's homes and 'handhold' them through the process, answering questions and otherwise providing guidance and support. They were able to provide invaluable face-to-

face interaction and could **tailor their engagement in real time based on the individual needs** of each household and where they are on their 'heat pump installation' journey. Contrast this to digital-only engagement approaches that tend to be more static and general, which were less effective at increasing awareness and reducing scepticism. It is clear that this is not an economically scalable approach on a long-term basis, however for future projects that are targeting deployment over the short term (e.g., 5 years) it can be an especially powerful approach and may even be needed in many cases. This is particularly whilst heat pumps are a relatively less familiar technology than gas boilers and whilst the consumer journey is longer and more complex.

5. As heat pump technologies and markets develop, there may be scenarios that are more suited to taking a high-density approach to deploying heat pumps. Where this is the case, future policy should take all of the learnings from this, and other relevant projects.

# 8. Next Steps

Upon completion of their project, the Carbon Trust engaged with each of the Phase 2 projects to understand the next steps for the project. This section details the findings of this engagement.

## 8.1. Bristol Heat Pump Ready

Since finishing their Heat Pump Ready project, the consortium members have progressed in various ways.

**Bristol City Council** (BCC) have continued to secure funding to process projects to install heat pumps across the city by working with the Microgeneration Certification Scheme (MCS) to highlight improvements to existing heat pump installations, collaboration with the University of Bristol and securing additional public funding.

Retrofit West, run by the **Centre for Sustainable Energy** (CSE)**,** took over the management of households interested in a heat pump installation through Bristol Heat Pump Ready, ensuring clients had the option to receive ongoing support.

**The Green Register** (TGR) has continued to build on its Installer Hub idea from the Bristol Heat Pump Ready project, to bring heat pump installers together and support each other through mentoring.

## 8.2. Oxford Clean Heat Streets

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 additional homes in nearby streets using the BUS grant. Several show homes were part of Oxford Open Doors in September 2024.

The team worked with another Heat Pump Ready 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 team is continuing to bid for other funding for projects which build on Clean Heat Streets and is continuing to collaborate with the University of Oxford.

## 8.3. Home Efficiency Hub Cherwell

There has been a definite improvement around attitudes to retrofit in the local area, with several residents showing interest in low carbon technologies. This project lays the groundwork for offering high-density heat pump installations in other areas by coordinating various elements to make the process smoother for both consumers and installers.

City Science has developed a suite of solutions to address the challenges of delivering retrofit at scale including an advance analytical platform, a recommendations engine. They are continuing to refine its Net Zero Partnerships offering, and its Heat Pump Ready learnings will inform the approach to hyper-local retrofit strategies.

Since finishing their Heat Pump Ready project, City Science has been working with the installer from the project, Carbon Rewind, and Cambridgeshire County Council on the Action on Energy Tool. As mentioned, City Science has also been working with another HPR project, Clean Heat Streets, and Cosy Homes from Oxfordshire County Council.

Oxfordshire County Council is now using the lessons learned from the Heat Pump Ready programme in future projects, such as a new app (Alternative Energy Markets) that will offer retrofit support.

## 8.4. Heat Pumps for Friday Bridge

Cambridgeshire County Council's Action on Energy brand is ongoing and was recently nominated for the Public Sector Transformation awards.

The council, as the lead authority of the Cambridgeshire Energy Retrofit Partnership (CERP), was awarded £8.5 million through the Warm Homes: Local Grant. This funding will be used to deliver energy performance and low carbon heating upgrades to low-income homes. The upgrades could include insulation, solar panels or an air source heat pump. Learnings from the Heat Pump Ready programme, including using community engagement officers and providing wider retrofit advice clearly to homeowners, will be incorporated in this new project.

# 9. Appendix 1: HPR Stream 1 structure and criteria

## 9.1. What was the Heat Pump Ready programme?

As a key solution for decarbonising homes, heat pumps will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050. The Heat Pump Ready Programme (HPR) formed part of the Government's £1 billion Net Zero Innovation Portfolio (NZIP), aimed to accelerate the commercialisation of innovative clean energy technologies and processes through the 2020s and 2030s.

The overarching objective of the Heat Pump Ready Programme was to create an enabling environment for heat pump deployment, overcoming remaining barriers to heat pump deployment by:

- Reducing the lifetime costs of domestic heat pumps (including capital equipment costs, installation costs and operating costs);
- Improving the lifetime consumer experience of heat pumps (including the experiences of learning about and choosing a heat pump and how to pay for it; having a heat pump installed in the home; and living with it);
- Stimulating innovative research and solutions to address the impact of domestic heat pumps on the electricity system;
- Improving the interoperability of domestic heat pumps with other smart technology in the home;
- Developing and strengthening partnerships between the many players involved in the domestic heat pump sector;
- Developing effective approaches and products to engage stakeholders effectively on heat pump issues with homeowners and with the key players who can help to deliver high-density heat pump deployment across the UK; and
- Establishing an evidence base to enable effective design and development of future heat pump policy and regulation.

## 9.2. What was the Heat Pump Ready Stream 1?

Heat Pump Ready Stream 1 supported the development and trial of innovative solutions and methodologies for the coordinated deployment of domestic heat pumps, at high-density (i.e. street-by-street approach), in the UK. The innovative methodologies were expected to provide:

- **An improved consumer journey:** A complete, 'hassle free' journey for the consumer which includes:
    - An understanding of a heat pump's role in heating their home
    - An assessment of their home
    - An assessment of their wants, needs and circumstances
    - The identification of optimum heat pump (e.g. sizes and types) tailored to their specific requirements, including the identification and installation of any necessary fabric and energy efficiency measures required
    - The identification of local installers
    - The delivery of the agreed heat pump system
    - The identification of suitable financing options and energy tariffs
    - A seamless network connection process
    - Advice on the operation of the heat pump
    - A high-quality installation and consumer protection
    - On-going maintenance and support

- **A cost reduction for consumers:** through the coordinated provision of heat pump deployment to a high-density of buildings in a single area.

- **An opportunity to understand the network impacts of high-density heat pump deployment:** through the engagement with Distribution Network Operators (DNOs) in parallel to the high-density deployment and opportunity to provide flexibility using multiple heat pump installations in a given area

*(Text from Heat Pump Ready Stream 1, Phase 2 Competition Guidance)*

## 9.3. Programme structure and criteria

Heat Pump Ready Stream 1 consisted of two phases:

**Phase 1: Feasibility**

- In Phase 1, a total of £2,055,202 was awarded to 11 projects across Great Britain to develop and trial innovative solutions and methodologies for optimising domestic heat pump deployment at high-density. The funding facilitated comprehensive feasibility studies, enabling project teams to assess the viability of large-scale heat pump installation projects in different areas.

**Phase 2: Delivery**

- Building upon the insights from Phase 1, four of these projects advanced to delivery in Phase 2, receiving a combined total of £4,744,047. Phase 2 focused on the practical implementation of the solutions designed during the feasibility studies, aiming to demonstrate innovative, cost-effective methodologies for high-density heat pump deployment.

The selection of projects for funding for both Phase 1 and Phase 2 was based on a comprehensive set of criteria to ensure effectiveness, replicability, and alignment with the programme's objectives.

### Stream 1 parameters for innovation methodology design

Projects in HPR Stream 1 developed innovative methodologies, using commercially available tools and technologies to achieve high-density deployment. The aim was for the innovative methodologies to reach consumer groups beyond the innovators and early minority, into the early majority. The project teams aimed to do this using a variety of methods, including community engagement, peer-to-peer support through neighbours and providing support throughout the customer journey. The methodologies were developed such that they could be scaled up and deployed to other geographical areas.

As part of the competition, a series of eligibility criteria were applied, a summary is provided below, with a full overview provided in the competition guidance, available here.

1. **Target number of homes**

Heat Pump Ready Stream 1 supported the development and trial of innovative approaches to enable high-density deployment of heat pumps within specific neighbourhoods - defined as 25% of homes within a specific area

Heat Pump Ready Stream 1 did not have a total target number of heat pumps it was aiming to deploy.  Instead, the focus was on the development of innovative optimised solutions to testing new methods of engaging with consumers, developing the supply chain and coordinating the necessary activity across the whole heat pump community (e.g. households, suppliers, installers, local authorities, community groups, etc.) to prepare for mass deployment.

2. **Target groups**

'Target groups' refer to specific areas of homes within the broader target neighbourhood, connected to the same part of the electricity network (e.g. a specific low-voltage network or secondary or primary sub-station). Under the terms of the Heat Pump Ready programme, once 25% of households within a target group agreed to having a heat pump installed, the project could progress through its Stage Gate and access the funding to deploy heat pumps to this target group.

The 25% recruitment target was later revised down to 15%, due to low customer recruitment across all projects. This was reported by the projects as being due to the cost-of-living and energy crisis having a significant impact on consumers' risk appetite to adopt heat pumps during the programme.

### 3. Stage Gates

The projects had a high-density deployment requirement. The stage gate assessment was required to confirm the project had achieved the heat pump deployment density of consumer quotes accepted before installations could take place. Each project defined the number of consumers which were to be recruited and the location of these consumers as part of their Phase 2 application.

### 4. Tenure

The programme guidance set the permitted limits for housing and building eligible under Heat Pump Ready Stream 1. The permitted housing and building type alongside deployment limit under Heat Pump Ready Stream 1 were as shown in the table below:

*Table A1-1: Permitted housing/building type and deployment limits under Heat Pump Ready Stream 1 - Solutions for High-density Heat Pump Deployment.*

| Building type | Permitted in Stream 1 trial? | Limit for Stream 1 trial<br>(as % of total heat pumps deployed in trial) |
|---|---|---|
| **Social housing**<br>**New Build (pre-occupancy)**<br>**Non-domestic** | Yes | **Maximum of 30% in total (i.e. for all three categories)** |
| **Off-gas grid homes** | Yes | **Maximum of 15%** |

At the point of Phase 2 application, projects teams were required to confirm the scale of the methodology being developed by selecting from the following categories:

- **Category A**: Heat pumps will be deployed in at least 25% of the domestic buildings on at least one low-voltage network within their chosen LAU Level 1 deployment trial locality; and/or

- **Category B**: Heat pumps will be deployed in at least 25% of domestic buildings served by at least one single secondary sub-station within their chosen LAU Level 1 deployment trial locality; and/or

- **Category C**: Heat pumps will be deployed in at least 25% of the domestic building on at least one primary sub-station within their chosen LAU Level 1 deployment trial locality.

### 5. Heat pump capital costs

Funding provided to consumers by the Heat Pump Ready programme covered the equivalent cost of the boiler upgrade scheme (BUS). Project teams were required to identify a funding route for the remainder of the capital cost of the installation, which was not covered by the programme. This was to ensure the innovative methodologies developed by the project teams was trialled in realistic conditions.

Additionally, the Heat Pump Ready programme provided up to £400 towards the cost of home surveys.

### 6. Programme timeline

All aspects of the customer journey were required to take place within the project lifetime. Projects within the programme were initially scheduled to close on 31st March 2025, which was extended to 30th August 2025 upon request of extension. Heat Pump Ready Steam 1. Phase 2 was split across Mobilisation (2a) and Deployment (2b), both of which were required to take place within the project timeline.

### 7. Technology requirements

The programme set out the heating technologies eligible to be deployed under Heat Pump Ready Stream 1 and limits of their inclusion in the trial. The aim of this programme is to support the deployment of the optimal heat pump technology for individual homes, where heat networks are not suitable, shown in Table A1-2.

*Table A1-2: Permitted heating technologies and deployment limits under Heat Pump Ready Stream 1 - Solutions for High-density Heat Pump Deployment.*

| Heat pump / source type | Permitted in Stream 1 trial? | Limit for Stream 1 trial (as % of total heat pumps deployed in trial) |
|---|---|---|
| **Low temperature* hydronic ASHP** | Yes | No limit |
| **Low temperature* hydronic GSHP** | Yes | No limit |
| **Non low temperature heat pumps. For example, hybrid heat pump, high temperature hydronic heat pump, air-to-air** | Yes – but with limit | net maximum of 20% of trial buildings. |

| | | |
|---|---|---|
| **heat pump, other direct electric heating solution** | | |
| **Shared ambient temperature ground loop connected to individual low temperature hydronic heat pumps** | Yes | No Limit |
| **Shared high temperature ground loop** | No | N/A |
| **Heat Network** | No | N/A |
| **Other domestic heating technologies not listed in this table** | No | N/A |

## 8. Replicability of methodology

The Heat Pump Ready programme aimed to developed innovative methodologies which can be repeated across similar areas, it did not aim to deploy heat pumps in niche locations which are not representative of the wider locations, demographics and house types across the UK.

## 9. Innovation and commercialisation

The methodologies trialled in Heat Pump Ready Stream 1 were required to be innovative and must not have been previously tested in the market or commercialised. However, heat pump technologies which were to be installed in consumers' homes were required to be commercially available as opposed to pre-commercial innovative technologies.

# 10. Appendix 2: Project Overviews

## 10.1. Heat Pump Ready Stream 1 projects: feasibility phase

Phase 1: Feasibility - 11 projects (see below) were funded to carry out feasibility studies on their approach to installing heat pumps in high-density in local areas throughout Great Britain.

*Feasibility stage projects (click on the project name for a link to the full feasibility study for each project)*

| Project name | Location | Lead organization | Support provided | Examples of innovative solutions explored |
|---|---|---|---|---|
| **Heat Pump Ready Newcastle** | Newcastle | E.ON Energy Solutions Limited | £188,546 | Created **digital twins** of target properties using drone and laser technology to improve accuracy and reduce survey time. Explored **Heat as a Service (HaaS)** to overcome the up-front cost barrier. |
| **Utilita Energy Heat Pump Ready Programme** | Sunderland | Utilita Energy Limited | £192,860 | Developed an **in-house vertically integrated heat pump delivery model** with **bulk purchasing** designed to reduce costs and open up heat pump deployment to **fuel poor households**. |
| **RHINOS (Renewable Heat Infrastructure Network Operating System)** | Leeds | Leeds City Council | £197,928 | Tested the viability **of shared ground loop arrays** for clusters of privately owned homes including in areas of **densely populated Victorian housing.** |
| **Clean Heat Streets** | Oxford | Samsung Electronics (UK) Limited | £199,614 | Developed a **data driven model for targeting homes** with the highest suitability for heat pump deployment, incorporating socio-economic factors and developed **community led engagement strategies** including show homes and heat pump champions. |

| | | | | |
|---|---|---|---|---|
| **Greenwich TIME (Thermal Infrastructure Motivating Electrification)** | London | Element Energy Limited | £199,171 | Developed a delivery model for **networked ground source heat pumps** with shared boreholes installed on **public roads.** |
| **Bristol Heat Pump Ready** | Bristol | Buro Happold | £198,167 | Created **a bespoke survey process including monitored data** for accurate system design and an **installer hub** to engage and train high-quality installers. |
| **Project Gaia** | Devon | EDF Energy R&D | £199,143 | Developed a **scalable methodology for identifying suitable properties** for heat pumps using geospatial mapping and EPC data and explored heat pump financing options including **Heat as a Service and Green Mortgages.** |
| **PACE Financing for Heat Pumps in Rural Cambridgeshire** | Fenland | City Science Corporation Limited | £196,935 | Explored the feasibility of **different lending models including green mortgages and local authority backed loans**. Identified **co-installation of solar PV** as a key factor in improving financial attractiveness of heat pumps. |
| **SAPPHIRE Solo** | Blairgowrie | Power Circle Projects | £83,870 | Assessed the viability of a model that **integrates heat pumps with solar PV and battery storage.** |
| **Prosumer Model for Heat Pump Deployment in Cherwell** | Cherwell | City Science Corporation Limited | £198,400 | Created a **one-stop-shop blueprint** offering a comprehensive customer journey from advice to aftercare. Tested the viability of a **prosumer model, combining heat pump installations with solar PV and battery storage**. |
| **Heat Pump Ready Bridgend** | Bridgend | Buro Happold | £195,385 | Built on the **Local Area Energy Plan**, to identify clusters of homes suitable to install ground source heat pumps on a shared loop. |

## 10.2. Heat Pump Ready Stream 1 projects: delivery phase

**Phase 2: Delivery -** 4 projects out of the 11 (see Table 2) were selected to advance to delivery in Phase 2. This focused on the practical, real-world implementation of their solutions, aiming to demonstrate innovative, cost-effective methodologies for high-density heat pump deployment.

*Phase 2 delivery projects*

| Project name | Location | Lead organization | Support provided | Key focus |
|---|---|---|---|---|
| **Clean Heat Streets** | Oxford | Samsung Electronics (UK) Limited | £2,143,597 | Targeted 600 homes in Rose Hill and Iffley, Oxford.<br><br>Value proposition focused on **community led engagement** through show homes and heat pump champions, community events and door knocking. |
| **Bristol Heat Pump Ready** | Bristol | Bristol City Council | £1,272,291 | Targeted 802 homes in Westbury on Trym, Bristol<br><br>Value proposition focused on a **high quality property survey** with pre-screened installers engaged via an **installer hub** delivering high quality installations. |
| **Heat Pumps for Friday Bridge** | Fenland | City Science Corporation Limited | £631,060 | Targeted 576 homes in Friday Bridge, Fenland.<br><br>Value proposition focused on **free home energy surveys** and **tailored financial support** with low interest finance. |
| **Home Efficiency Hub Cherwell** | Cherwell | City Science Corporation Limited | £697,099 | Targeted 529 homes in Bicester, Oxfordshire<br><br>Value proposition focused on the **'prosumer model'** of heat pumps with solar PV and battery storage and a **low-interest finance** offer. |

Case studies for all the Phase 2 projects, with full details of the innovative methodologies trialled, can be found on [the .gov.uk website.]()

# 11. Appendix 3: High-density deployment feasibility studies: Projects, key activities and findings

The following tables summarise the key activities undertaken by each of the 11 projects funded as part of HPR Stream 1 – Phase 1: Feasibility, their key findings, and steps taken after the feasibility study.

## 11.1. Heat Pump Ready Newcastle

**Lead organisation:** E.ON Energy Solutions

**Key partners:** Newcastle City Council, Northern Powergrid, Heatio, TwentySeven Design, Nationwide Drones

**Key activities:**

- Analysed 31,646 properties across eight priority areas in Newcastle to assess heat pump feasibility.
- Used multi-layered data (demographics, energy consumption, existing retrofits, affluence levels, and property archetypes) to create a detailed zoning map for deployment.
- Conducted a grid analysis of secondary substations, assessing whether they could support 25% heat pump penetration.
- Tested drone-based and digital twin technology for property heat loss assessment, reducing time and improving data accuracy.
- Conducted focus groups, surveys, and digital engagement campaigns to understand barriers to adoption.
- Developed a heat pump marketing strategy, including a customer segmentation model targeting early adopters.
- Analysed the feasibility of subscription-based financing for heat pumps to overcome upfront cost barriers.
- Conducted a pilot case study, offering a heat pump package at a £1,000 upfront cost with a £175 monthly subscription for installation, servicing, and maintenance.

**Key findings:**

- The project required a 25% adoption rate at the substation level, but feasibility analysis found that 57% of substations would exceed 100% capacity if heat pumps were installed at the desired density.

- 37% of secondary substations lacked detailed property-to-substation mapping data, increasing deployment risk.
- Affluent households were more likely to adopt heat pumps, but their location did not align well with grid capacity.
- While Heat as a Service (HaaS) reduced upfront cost barriers, market confidence in subscription models was low.
- Financial institutions required more performance data and proof of return on investment before backing HaaS schemes.
- Customers responded better to neighbourhood-based engagement models rather than national or city-wide marketing.
- Peer advocacy (hearing from existing heat pump users) was the strongest motivator for adoption.

**Next steps after feasibility study**

The project did not progress to Phase 2. However, Newcastle City Council and Northern Powergrid will continue to grid analysis work to inform future network planning. Also, E.ON and Heatio have partnered on a Green Home Finance Accelerator project to further develop the Heat as a Service (HaaS) model.

## 11.2. Project Gaia

**Lead organisation:** EDF Energy R&D UK Centre

**Key partners**: University of Sheffield, Urbanomy, Kensa, UCL, BEIS, Enzen Global Limited

**Key activities:**

- Used geo-spatial mapping, EPC data, and housing stock analysis to identify homes suitable for heat pumps.
- Worked with DNOs to assess grid capacity and determine the feasibility of large-scale installations.
- Conducted consumer engagement research through focus groups and surveys to understand homeowner attitudes.
- Explored financing models, including Heat as a Service (HaaS), green mortgages, and flexible repayment plans.
- Developed a digital twin model to simulate heat pump performance across different property types.
- Compared heat pump costs over 10-, 20-, and 30-year periods to assess financial viability.
- Investigated the impact of bundling heat pumps with solar PV and battery storage on affordability and energy efficiency.

**Key findings:**

- Heat pump adoption required an end-to-end consumer journey with clear guidance, from awareness to installation.
- Consumer awareness of financial incentives was low, highlighting the need for targeted education.
- Grid constraints posed a significant barrier, requiring early-stage engagement with DNOs.
- Heat pumps alone were not financially competitive with gas boilers, but combining them with solar PV improved affordability.
- Retrofitting costs varied significantly by property type, requiring case-by-case assessment.

**Next steps after feasibility study:**

The project did not progress to Phase 2. However, EDF will use the findings to refine high-density deployment strategies and inform future policy discussions on consumer financing for heat pumps.

## 11.3. Utilita Energy Heat Pump Ready

**Lead organisation:** Utilita Energy

**Key partners:** Sunderland City Council, Gemserv, Northern Powergrid

**Key activities:**

- Developed an in-house, vertically integrated heat pump delivery model to reduce reliance on third-party contractors and lower costs.
- Selected Fulwell, Sunderland as the target deployment area based on housing suitability and grid capacity.
- Engaged Northern Powergrid to assess the local network's capacity and ensure grid resilience.
- Performed market research and consumer surveys to understand affordability concerns and barriers to adoption.
- Compared the 20-year lifetime costs of heat pumps versus gas boilers, demonstrating the financial case for heat pumps.
- Implemented bulk purchasing of heat pumps, aiming to reduce costs through supply chain efficiencies.
- Established an LCL-accredited heat pump training academy to increase the number of qualified installers in Sunderland area.
- Developed an automated pre-notification system for Distribution Network Operator (DNO) engagement, enabling proactive grid planning.
- Designed a post-installation support package, including a free first-year service and a two-year workmanship guarantee to increase consumer confidence.

**Key findings:**

- High upfront costs remained a significant barrier, even though bulk purchasing and internalised installation reduced overall customer costs.
- Engaging with the DNO early was crucial to managing grid constraints and avoiding delays.
- Installer availability in Sunderland was limited, with only seven MCS-accredited heat pump installers in the region, necessitating training initiatives.
- Consumer confidence in heat pumps was low, requiring clear communication and strong aftercare support to reassure customers.

**Next steps after feasibility study:**

The project did not progress to Phase 2, however, Utilita planned to make further progress on scaling the in-housed delivery model and strengthening the local installer workforce.

## 11.4. Leeds RHINOS (Renewable Heat Infrastructure Network Operating System)

**Lead organisation:** Leeds City Council (LCC)

**Key partners:** Arup, Kensa Contracting Ltd, Parity Projects, University of Leeds, Leeds Beckett University, Otley Energy, Legal & General, Northern Powergrid, IRT Surveys

**Key activities:**

- Developed a methodology for high-density heat pump deployment in privately owned homes, focusing on shared ground borehole arrays as a low-carbon heating solution.
- Conducted housing stock analysis and network mapping in Otley, Yeadon, Chapel Allerton, and Roundhay, identifying high concentrations of suitable properties.
- Engaged with Northern Powergrid to assess grid impact.
- Carried out consumer research with Leeds residents, including surveys with 1,000 participants.
- Developed a business model for shared ground arrays, exploring financing options such as a Special Purpose Vehicle (SPV).
- Examined supply chain capacity and installer availability, identifying concerns about whether the market could scale.
- Designed a customer journey framework, mapping out the end-to-end process for homeowner adoption of heat pumps.

**Key findings:**

- Low homeowner willingness to adopt heat pumps was identified, primarily due to high upfront costs and low projected savings.
- Homeowners were unlikely to replace working gas boilers, with many indicating they would only switch if a breakdown occurred.
- Only 18% of surveyed homeowners reported they were living comfortably, and 33% were either "just about getting by" or "finding it difficult" financially, limiting willingness to invest in heat pumps.
- Grid impact of shared ground arrays was lower than expected, making them a viable option for dense urban settings.
- The electricity-to-gas price ratio made heat pumps financially unattractive in the current market.
- The business model required a minimum density of uptake to be viable, and projections showed that expected adoption rates were too low to support shared borehole infrastructure.

- Supply chain limitations were identified, with concerns about skilled workforce availability, particularly in areas where heat pump deployment had not yet been scaled.

**Next steps after feasibility study:**
The project did not progress to Phase 2 due to the challenges identified in uptake, financial feasibility, and consumer willingness. The consortium concluded that it could not provide sufficient confidence in a successful trial deployment. However, Leeds City Council will use the findings to inform retrofit zoning policies and develop a broader one-stop shop for retrofit services in the city. The council is also exploring the potential role of local authorities in funding and delivering shared ground arrays, learning from its involvement in the Leeds PIPES district heating system.

## 11.5. Oxford Clean Heat Streets

**Lead organisation:** Samsung R&D Institute UK

**Key partners:** BOXT Limited, GenGame Limited, University of Oxford, Oxford Brookes University, Oxfordshire County Council, SMS Energy Services Ltd

**Key activities:**

- Employed Oxford Brookes University's LEMAP tool to analyse heat pump suitability based on economic, technical, and social factors.
- Developed a methodology for high-density heat pump deployment in the Rose Hill and Iffley area of Oxford, identifying suitable homes based on fabric standards and energy efficiency.
- Conducted a community-wide engagement program, including door-to-door surveys, co-design sessions, and collaboration with local groups like Rose Hill and Iffley Low Carbon (RHILC).
- Worked with Scottish and Southern Electricity Networks (SSEN) to assess network constraints and investigate static and dynamic control strategies to allow for higher heat pump penetration without excessive grid reinforcements.
- Explored tariff structures and financial models, including time-of-use electricity pricing, to improve affordability.
- Installed monitoring equipment at substations and within homes to track heat pump performance and grid impact.
- Developed an automated pre-survey tool, reducing assessment costs and streamlining consumer onboarding.

**Key findings:**

- Community engagement was most effective when facilitated by local sustainability groups rather than external stakeholders.
- Existing solar PV owners were more likely to consider heat pumps, aligning with findings that interest in low-carbon technologies clusters within specific demographics.
- Static control strategies were found to be effective at reducing peak demand, while dynamic control strategies could further optimise network balancing.
- Pre-survey automation reduced recruitment costs, making it easier to assess household suitability at scale.
- Financial feasibility remained a challenge, as leasing models for heat pumps were not viable without additional subsidies.
- Grid integration required detailed mapping of property-to-substation connections, an area where data gaps posed a challenge.

**Next steps after feasibility study:**
The project progressed to Phase 2: Delivery

## 11.6. Greenwich TIME (Thermal Infrastructure Motivating Electrification)

**Lead organisation:** Element Energy

**Key partners:** DG Cities, Kensa, South East London Community Energy (SELCE), OVO Energy, UK Power Networks (UKPN), Royal Borough of Greenwich

**Key activities:**

- Developed a high-density heat pump deployment methodology focusing on networked ground source heat pumps (GSHPs) in terraced housing to overcome space constraints.
- Conducted housing stock analysis in Greenwich to identify pre-1919 terraced homes as a priority target for networked GSHP deployment.
- Worked with UK Power Networks (UKPN) to assess grid capacity, but found that secondary substation data was limited and often inaccurate, making network planning difficult.
- Designed a split-ownership financing model, separating ground loop infrastructure costs from household heat pump costs, similar to how gas networks operate.
- Developed a consumer engagement strategy, including door-knocking, surveys, and workshops, to increase awareness and gauge public interest.
- Explored time-of-use tariffs and cost modelling, aiming to ensure households switching to heat pumps would not see increased annual energy bills.
- Worked with local training providers to build supply chain capacity, ensuring enough skilled installers would be available for large-scale deployment.

**Key findings:**

- Networked GSHPs were technically viable for terraced housing and could be deployed efficiently at scale, but financing remained a major barrier.
- UKPN had limited substation-level data, which complicated grid capacity assessments. The project had to manually request data for 15 secondary substations, and even then, some information was estimated rather than precise.
- Consumer engagement was essential, as awareness of heat pumps was relatively low in Greenwich. Residents responded best to peer advocacy and community-led information sharing rather than direct sales.
- Time-of-use tariffs and efficiency measures were necessary to ensure that heat pumps remained cost-competitive with gas heating.
- Installer availability was a concern, as the transition from gas boilers to heat pumps required workforce upskilling. The project identified a need for more local training initiatives.

**Next steps after feasibility study:**
The project did not progress to Phase 2, primarily due to financing and policy uncertainties. However, the findings will be used to support future GSHP projects, particularly in urban terraced housing where space constraints make air source heat pumps impractical.

## 11.7. Bristol Heat Pump Ready

**Lead organisation:** Buro Happold

**Key partners:** Bristol City Council, Centre for Sustainable Energy (CSE), The Green Register, National Grid Electricity Distribution (NGED), Sustainable Westbury-on-Trym (SusWoT)

**Key activities:**

- Analysed 8,551 dwellings in the Westbury-on-Trym area of Bristol to assess suitability for heat pump installations.
- Developed a Heat Pump Ready survey process based on monitored data, refining data collection for accurate system design. This was trialled on five homes in partnership with a Stream 2 project.
- Engaged with local sustainability groups to understand community concerns and shape customer engagement strategies.
- Developed a business model for a supplier hub, linking trusted installers and surveyors while ensuring quality standards.
- Designed a self-sustaining financial model, leveraging economies of scale to reduce costs for consumers and suppliers.

- Worked with NGED to explore grid capacity and data-sharing challenges, identifying barriers to large-scale heat pump deployment

**Key findings:**

- 859 homes were identified as heat pump-ready with no fabric upgrades required, while 3,613 homes required only minor fabric improvements.
- Residents with solar PV were more likely to consider heat pumps, indicating that prior adoption of renewable technology increased openness to switching heating systems.
- Consumers wanted high-quality home surveys and were willing to pay up to £500 for a multi-faceted assessment, suggesting demand for trusted advisory services.
- Heat pump installer shortages were a key barrier, reinforcing the need for workforce training and certification schemes.
- Current DNO data limitations prevented accurate low-voltage network planning, requiring approximations for property-to-substation assignments.

**Next steps after feasibility study:**

The project progressed to Phase 2 led by Bristol City Council, aiming to:

- Refine the business model for large-scale deployment, ensuring financial viability and supply chain resilience.
- Develop a consumer portal, providing information on heat pumps, surveys, and trusted installers.
- Expand installer training and certification programs to address local workforce shortages.

Work with NGED to improve data-sharing protocols, supporting better network planning and flexibility for heat pump adoption.

## 11.8. PACE financing for heat pumps in rural Cambridgeshire

**Lead organisation:** City Science

**Key partners:** Cambridgeshire County Council, Fenland District Council, Peterborough Environment City Trust (PECT), Growth Guides, Lendology

**Key activities:**

- Explored the feasibility of high-density heat pump deployment in Fenland, Cambridgeshire, by assessing 25% installation targets within identified electricity networks.
- Conducted cost modelling for air-source heat pumps (ASHPs), comparing total lifetime costs with gas boilers under various energy price scenarios.
- Performed consumer engagement, including a digital survey with 802 responses, four focus groups, and 102 door-to-door interviews to understand barriers to heat pump adoption.

- Assessed different home archetypes, identifying that bungalows were particularly suitable for retrofitting heat pumps.
- Reviewed various financing models, focusing on the Property Assessed Clean Energy (PACE) system from the US, and examined other lending options such as green mortgages and local authority-backed loans.
- Engaged with 12 financial institutions to understand their willingness to develop low-interest financing products for heat pump deployment.
- Conducted a supply chain analysis, revealing inconsistencies in installer approaches, with some completely replacing existing wet heating systems and others preserving components where possible.

**Key findings:**

- Heat pumps were found to be more expensive than gas boilers over their lifetime, even under the government's Energy Price Guarantee.
- The addition of solar PV significantly improved the financial viability of heat pump adoption, provided that homeowners were willing to make a long-term investment.
- Energy tariffs had a substantial impact on the affordability of heat pumps, meaning future price fluctuations could alter the feasibility of mass deployment.
- The PACE financing model was deemed unsuitable for the UK, as its reliance on property taxation would require regulatory and legal changes that were unlikely in the short term.
- Green mortgages offered the lowest interest rates, but rising mortgage costs in 2022 made them less attractive than anticipated.
- A financing model provided by Lendology, which utilises local authority-backed loans, was identified as the most suitable option for supporting heat pump adoption.
- Homeowners in fuel poverty faced fewer lending options, with many financing products charging high interest rates, reducing affordability.

**Next steps after feasibility study:**

The project progressed to Phase 2 under the name Heat Pumps For Friday Bridge.

## 11.9. SAPPHIRE Solo

**Lead organisation:** Power Circle Project Ltd

**Key partners:** The Heat Project, MCA Renewables, Connect 3 Consultants, Energy Systems Research Unit (ESRU) at Strathclyde University, GeoSpatial Insights Limited, ZUoS Ltd

**Key activities:**

- Investigated how to make high-density heat pump deployment affordable and attractive in an on-gas area by assessing a combination of heat pumps, solar PV, and battery storage.
- Conducted aerial LiDAR and OS mapping of 1,000 houses in Blairgowrie to assess solar PV potential, identifying a total community-wide potential of 8.365MW.
- Performed energy and financial modelling, comparing three technology combinations: heat pump only, heat pump + solar PV, and heat pump + solar PV + battery storage.
- Undertook thermal and electrical load assessments for four different house types, designing an optimal system based on energy use patterns.
- Engaged with Scottish and Southern Electricity Networks (SSEN) to assess grid capacity and potential network constraints for high-density heat pump installations.
- Surveyed 115 households to understand consumer awareness, attitudes, and key barriers to heat pump adoption.
- Developed and tested a householder engagement approach, including door-to-door outreach, an online survey, a focus group, and a public community event.
- Engaged with local supply chain actors, identifying 9 heating engineers and 11 electricians based in Blairgowrie to assess training needs and capacity gaps.

**Key findings:**

- Heat pump and solar PV combinations were significantly more cost-effective than heat pumps alone, offering better long-term savings for consumers.
- 37% of households engaged through door-to-door contact expressed interest, showing that high-intensity outreach was more effective than passive engagement methods.
- Older homeowners were less likely to adopt heat pumps, often due to concerns about upfront costs, recent boiler installations, or uncertainty about staying in their homes long-term.
- Local supply chain capacity was limited, with most heating engineers operating as sole traders, making it difficult to scale installation capacity without additional training support.
- The availability of Scottish Government grants and interest-free loans significantly influenced homeowner interest, reducing financial barriers to adoption.

- Grid capacity was not a primary constraint in the chosen study area, but engaging early with SSEN was essential for managing future network reinforcement needs.

**Next steps after feasibility study:**
The project did not progress to Phase 2, as at the time, existing Scottish Government incentives provided more attractive funding options than the Heat Pump Ready Programme Phase 2. Instead, the findings will be used to continue supporting households interested in heat pump installations through The Heat Project, offering advice on funding and system optimisation.

## 11.10. Prosumer model for heat pump deployment in Cherwell

**Lead organisation:** City Science Ltd

**Key partners:** Oxfordshire County Council, National Energy Foundation, Growth Guides, Trust Power, Lendology

**Key activities:**

- Developed a Building Level Model to quantify heat pump installation viability by building typology and identify target areas in Cherwell, Oxfordshire.
- Designed and tested a Prosumer Model, integrating heat pumps with solar PV and battery storage, aimed at improving financial viability.
- Established a One Stop Shop model to streamline the customer journey, providing tailored advice, supplier recommendations, and post-installation support.
- Engaged with Scottish and Southern Energy Networks (SSEN) to assess grid capacity in target areas.
- Conducted community engagement and consumer research, including local workshops and consultations to assess household interest in heat pumps and prosumer systems.
- Developed a supply chain strategy, working with industry partners to standardise heat pump installations and explore cost-reduction opportunities.

**Key findings:**

- The Prosumer Model showed financial benefits, with the potential to offer annual savings of approximately £800 compared to standalone heat pump retrofits.
- Customer engagement indicated strong interest in combining heat pumps with solar PV, as self-generation and energy bill savings were key motivators.
- Target areas within Northwest Bicester were identified as the most suitable for high-density heat pump deployment based on building typology, EPC ratings, and grid constraints.
- The One Stop Shop approach was well received, with feedback indicating that a trusted advisory service would help reduce barriers to heat pump adoption.

- Grid capacity varied across the target area, and further collaboration with SSEN was recommended to ensure substations could support increased heat pump deployment.
- Upfront costs remained a significant barrier, with financing models needed to make heat pump adoption more accessible.

**Next steps after a feasibility study:**
The project progressed to Phase 2, focusing on:

- Implementing the One Stop Shop to simplify customer engagement and improve the heat pump adoption journey.
- Deploying the Prosumer Model in Northwest Bicester, aiming to achieve 25% heat pump density within the local electricity network.
- Continuing collaboration with SSEN to monitor grid constraints and support infrastructure planning for large-scale heat pump deployment.
- developing innovative financing solutions to make heat pumps more accessible to a broader range of households.

## 11.11. Heat Pump Ready Bridgend

**Lead organisation:** Buro Happold

**Key partners:** Bridgend County Borough Council (BCBC), Kensa Utilities, NuVision Energy Wales, Challoch Energy, National Grid Electricity Distribution (NGED, formerly Western Power Distribution

**Key activities:**

- Conducted an assessment of high-density heat pump deployment feasibility in Bridgend County, including urban and rural areas.
- Identified locations with high proportions of space-constrained properties where Air Source Heat Pumps (ASHPs) may not be suitable, proposing Ground Source Heat Pumps (GSHPs) with Shared Ground Arrays (SGAs) as an alternative.
- Collaborated with NGED to assess network capacity for heat pump deployment and identify areas with sufficient electricity grid network capacity for short-term roll-out.
- Conducted stakeholder engagement, including community consultation events, supply chain discussions, and engagement with local government representatives.
- Developed an initial business model for heat pump deployment, including potential financing mechanisms for Shared Ground Arrays.

- Targeted 150 homes for potential deployment in Phase 2, with 126 identified as suitable for GSHP + SGA and 30 suitable for ASHP.

**Key findings:**

- Ground Source Heat Pumps with Shared Ground Arrays were identified as a viable solution for homes in Bridgend where ASHP installation would be impractical due to space constraints.
- Community engagement was adequate, with an open-day event attracting 30 attendees representing 17 homes who expressed interest in heat pumps.
- The project team identified challenges around the granularity of DNO data and the limitations of EPC data, which affected the ability to determine precise network constraints. Data-sharing agreements with the DNO were recommended to overcome these issues.
- The feasibility study proposed establishing a customer advisory service in Phase 2 to coordinate consumer engagement and provide a centralised point of contact.
- Collaboration with local colleges was recommended to build installer capacity and develop training programs to support local supply chains.

**Next steps after feasibility study:**

The project team intended to continue investigating the potential for this scheme in Bridgend. The proposed next steps included securing private investment for shared ground arrays, expanding consumer engagement efforts, and continuing collaboration with BCBC and NGED to refine deployment strategies.

# 12. Appendix 4: Heat Pump Ready Stream 1 Phase 2 delivery projects: Key activities and findings

## 12.1. Bristol Heat Pump Ready

### Bristol Heat Pump Ready project at a glance

**Location:**

- 802 homes in Westbury-on-Trym, Bristol
- Target of 200 installations
- No grid constraints
- Affluent population
- High proportion of EPC C buildings

**Project partners:**

- Bristol City Council led consortium
- Key delivery roles: Centre for Sustainable Energy, The Green Register
- Sub-contractors: Buro Happold, Veritherm, Sustainable Westbury-on-Trym and Bristol Energy Network

**Proposition to customers:**

- The project aimed to simplify the customer journey, offering technical support, home surveys, and financing options, and leveraging community-led engagement to overcome scepticism.
- Customers were offered a 'One Stop Shop' model, providing independent advice, home energy assessments, and access to vetted installers.
- Heat pumps were promoted as a cost-effective and sustainable heating solution, with options to bundle them with home energy efficiency improvements.

**Results:**

- 802 households identified as eligible for heat pump.
- 42% of eligible households engaged via door-knocking.
- 21 Veritherm heat loss surveys were completed
- 111 attendees participated in 8 workshops
- 6 Green Open Homes events attracted 17 attendees
- 10 drop-in sessions, attended by 15 people
- Social media ads achieved 32,660 impressions and 971 follow-through clicks
- No consumers proceeded to installation, leading to project closure.

### The chosen project area

Westbury-on-Trym was chosen as the target location due to its **high proportion of owner-occupied homes** and strong **community engagement with sustainability initiatives**. The area's housing stock was considered **well-suited to heat pump adoption** based on the following factors:

- **60% of homes were built in 1930 or later**, meaning they had a level of insulation and construction quality that made heat pump installations feasible.
- **60% of homes had an EPC rating of D or above**, indicating that additional energy efficiency improvements would not be required for a majority of properties.
- **The area had an active sustainability group (Sustainable Westbury-on-Trym)**, which was expected to enhance community engagement and confidence in the project.
- **A lower proportion of residents in financial distress compared to the Bristol average**, making the upfront cost of heat pump installations potentially less of a barrier.

### Target group area breakdown

| Target group | Total number of homes in target group | Number of homes targeted (25%) | Total number of homes with doorstep discussions | % of homes with doorstep discussions | Surveys completed | Surveys as % of total |
|---|---|---|---|---|---|---|
| 1 | 140 | 36 | 99 | 71% | 8 | 6% |
| 2 | 216 | 56 | 98 | 45% | 4 | 2% |
| 3 | 313 | 82 | 104 | 33% | 7 | 2% |
| 4 | 133 | 34 | 0 | 0% | 2 | 2% |
| **Total** | **802** | **208** | **301** | **38%** | **21** | **3%** |

### Project partners and their roles on the project

| Organisation | Role on project |
| --- | --- |
| Bristol City Council | Lead organisation responsible for overall project coordination and strategy. |
| Centre for Sustainable Energy (CSE) | Led consumer engagement, developed customer journey framework, and provided independent energy advice. |
| The Green Register | Provided training and certification support for installers to ensure quality standards. |
| Buro Happold | Technical lead, responsible for heat loss assessments and feasibility modelling. |
| Veritherm | Developed and implemented the Veritherm HEAT tool for heat loss testing. |
| Build Test Solutions | Assisted with home energy efficiency assessments and testing methodologies. |
| Sustainable Westbury-on-Trym | Acted as a local community partner, hosting events and promoting heat pumps. |
| Bristol Energy Network | Supported outreach efforts and facilitated peer-to-peer advocacy. |
| CIG Consultants | Provided additional market and financial analysis. |

### The proposition to customers

The core proposition of Bristol Heat Pump Ready was designed to **simplify and de-risk the transition to heat pumps** for homeowners by offering:

- **A 'One Stop Shop' model**
    - Independent, trusted advice from CSE.
    - Support with understanding heat pump benefits, installation process, and available funding options.
    - Pre-vetted, MCS-accredited installers to ensure quality installations.

- **Comprehensive home survey and energy assessment**
  - Veritherm HEAT tool used for in-depth heat loss testing.
  - Home energy assessment results provided to guide the correct heat pump sizing and design.
- **Support in overcoming cost barriers**
  - The intention was for customers to be provided with discounted heat pumps through bulk purchasing agreements with major manufacturers such as Samsung, Clivet, Vaillant, and Daikin. Fifty households were chosen for complimentary home surveys, although only eight advanced to the approval stage.

### Approach to customer engagement and recruitment

The Bristol Heat Pump Ready project focussed on the following strategies for customer recruitment:

- **Workshops and information sessions**
  - 8 workshops with 111 attendees covered key topics such as retrofit options, energy efficiency, and heat pump benefits.
  - 6 Green Open Homes events with 17 attendees allowed residents to visit homes with heat pumps installed.
  - 10 drop-in sessions attended by 15 people, hosted by Sustainable Westbury-on-Trym.
- **Community and digital outreach**
  - Door-knocking campaign engaged 42% of eligible households in direct conversations.
  - Social media campaign achieved 32,660 impressions and 971 click-throughs, demonstrating engagement but limited conversion to installations.
- **Surveys and home assessments**
  - 21 homes completed heat loss assessments using Veritherm technology.

- Homeowners received recommendations on heat pump sizing and suitability.

### Key project learnings

1. The Bristol Heat Pump Ready Project encountered an **overall lack of consumer confidence in heat pump technology**, and the availability and quality of installers were identified as a major barrier.

2. 14 MCS-accredited installers were identified in Bristol, but **installer engagement weakened over time** due to delays in consumer recruitment.

3. **Upfront costs remained a significant deterrent**, despite efforts to negotiate bulk pricing and offer financing options.

4. **The e customer journey needed further simplification**—as households found the process too time-consuming or confusing.

5. Engagement with heat pump manufacturers (Samsung, Clivet, Vaillant, and Daikin) was productive, but uncertainty over demand made it **difficult for Bristol to secure price reductions** that would have enabled lower-cost installations for customers.

6. **National Grid Electricity Distribution (NGED) was engaged early**, but **detailed low-voltage network data was not available**, preventing targeted consumer recruitment based on network capacity. **Potential transformer upgrades could have taken 3–6 months**, delaying installations.

7. **Alternative financing solutions should be explored**, as upfront costs remain a primary barrier to adoption.

### Conclusion

Despite strong engagement efforts, the Bristol Heat Pump Ready project faced significant challenges in consumer recruitment, leading to no installations and early project closure. However, the project generated valuable insights into customer engagement, installer coordination, and grid integration, which can inform future large-scale heat pump deployment strategies.

## 12.2. Oxford Clean Heat Streets

### Oxford Clean Heat Streets project at a glance

**Location:**

- Rose Hill and Iffley, Oxford
- Target area covered approximately 600 homes
- Mix of income levels and property values
- Majority of homes with an EPC rating of D or above

**Project partners:**

- Lead organisation: Samsung
- Key delivery roles: Oxford University, Oxford Brookes University, GenGame, SMS Plc, Passiv UK, Oxfordshire County Council, Oxford County Council
- Community engagement: Rose Hill and Iffley Low Carbon Group (RHILC)

**Proposition to customers:**

- The project aimed to reduce the friction and cost associated with installing a heat pump through a street-by-street approach.
- Customers were offered a streamlined journey, from initial assessment to installation, with local engagement playing a central role.
- The project tested different financing models and secured discounted tariffs for participating households.

**Results:**

- 103 expressions of interest from residents.
- 4 Open Home events attracted 97 visitors, improving community awareness.
- Community engagement and confidence-building was strong, but uptake remained limited.
- Targeted door-knocking and personal engagement proved to be the most effective outreach methods.
- 8 air-source heat pumps installed within project scope (plus an additional 6 for Heat Pump Champions).
- At the time of writing, Oxford Clean Heat Streets was still recruiting customers for heat pumps and installing heat pumps in homes independently of the Heat Pump Ready project.
- In total Clean Heat Street installers installed 31 heat pumps in the area.

## The chosen project area

Rose Hill and Iffley were selected as the target area for the Clean Heat Streets project due to several key factors:

- **Existing local sustainability initiatives** led by the Rose Hill and Iffley Low Carbon Group (RHILC) provided a strong base for community-driven engagement.
- **Previous engagement of this community through Project LEO** (Local Energy Oxfordshire) provided existing community contacts that the project could engage with.
- The housing stock in the area contained a mix of both owner occupiers and social housing tenants that was **broadly representative of the national housing stock**, meaning that the learnings were broadly applicable to other areas of the country
- **The mixed tenure of the housing stock** allowed the project to explore different barriers to adoption.

**Target group area breakdown** *(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 |

## Project partners and their roles on the project

| Organisation | Role on project |
| --- | --- |
| **Samsung** | Lead organisation, overall project coordination, and financing strategy development |
| **Oxford Brookes University** | Led segmentation and analysis of energy demand |
| **Oxford University** | Supported energy analysis and research |
| **GenGame** | Led consumer engagement strategy |
| **SMS Plc** | Led installer processes and heat pump installation coordination |
| **Passiv UK** | Provided heat pump commissioning support |
| **Oxfordshire County Council** | Provided advisory support on engagement and policy alignment |
| **Oxford City Council** | Provided Community Engagement Officer |
| **Rose Hill and Iffley Low Carbon Group (RHILC)** | Community partner support |
| **Alto** | Heat loss surveyors and heat pump system installers |

## The proposition to customers

The Clean Heat Streets project was designed to reduce barriers to heat pump adoption by offering:

- **Street-by-street engagement and installation**
    - Customers were recruited based on a targeted approach using energy data and community insights.
    - The project prioritised early adopters to generate social proof, build momentum within streets and encourage wider adoption.
- **Transparent and attractive cost and financing models**
    - The project secured a discounted tariff with British Gas, providing a 50% running cost reduction for the first winter (2024/25).
    - Collaboration with OVO Energy allowed free cavity wall insulation for eligible homes, improving energy efficiency.

    - Alternative finance options (e.g., low-interest loans) were explored but not widely taken up.
- **Comprehensive home surveys and tailored recommendations**
    - Free home surveys were conducted to assess suitability.
    - Customers received bespoke recommendations, including heat pump sizing, radiator upgrades, and potential energy efficiency improvements.

### Approach to customer engagement and recruitment

Oxford Clean Heat Streets employed multi-channel engagement but heavily focusing on confidence-building through face-to-face interactions via engaged members of the community:

- **Heat pump champions and open homes**
    - 6 early adopters installed heat pumps and hosted Open Home events (8 events held roughly once per month).
    - 8 Open Home events, attended by 97 people, providing real-world demonstrations of heat pumps in action.
- **Community workshops and public events**
    - A launch event at the local community centre (29 April 2023, nearly 100 attendees)
    - A Festive Energy Day at the local community centre (9th December 2023).
    - A first-year anniversary event (15th June 2024)
    - A “Preparing for winter event” at the local community centre (18th Sept 2024).
    - A meet the local politicians event (11th October 2024)
    - A final celebration and workshop event at the local community centre (31st January 2025)
    - Throughout the project various other local community events were attended with a CHS stall. These were hosted by RHILC and the wider Rose Hill Community Networks.
- **Dedicated project officer**
    - A dedicated project officer was employed by Oxford City Council to provide face-to-face home visits and drop-in sessions to support homeowners.
    - 2-3 visits were conducted per home where required to address any concerns and help facilitate the installation process.
- **Direct outreach and digital engagement**
    - Door-to-door outreach was prioritised over digital methods, partly due to a relatively elderly population in the area.

- A website and online forum was created to engage digitally literate homeowners.
- 117 households signed up for email updates on the project.

### Key project learnings

1. **Hyper local engagement of the community was crucial to overcoming scepticism in the technology and the project**

    a. Local community group Rose Hill & Iffley Low Carbon **helped build credibility** and drive engagement.

    b. Households were **more likely to engage** when information came from peers in their community rather than commercial partners.

    c. Heat Pump Champions helped **counter common misinformation** about heat pumps with first-hand experience and testimonials

    d. **Open Homes allowed homeowners to see heat pumps** in use and understand real-world performance.

    e. **Seeing heat pumps in operation** was crucial to address common concerns about noise, cost, and space requirements.

2. **The dedicated project officer was instrumental to addressing concerns and facilitating installations**

    a. On-the-ground engagement was found to be **highly effective** at addressing common concerns improving customer confidence and helping to manage the survey, design and installation process.

    b. However, this approach is **resource-intensive** relative to the number of installations achieved and may not scale easily.

3. **High upfront costs remained a barrier**

    a. While discounts and financing options were explored, **all installations required full upfront payment**.

4. **SSEN provided early substation data**, ensuring there were no major grid constraints in the project area. This meant that **grid integration was smooth, but**

**scalability is uncertai**n and learnings on **deploying heat pumps in constrained networks** were limited.

### Conclusion

Oxford Clean Heat Streets successfully **piloted a street-by-street deployment model**, using **community-led engagement** to increase homeowner confidence.

The Oxford project demonstrated the high impact of peer-to-peer learning and persuasion for customers and the power of social proofing of new technology through a co-ordinated programme of engagement.

The project partners are optimistic about the scalability of the project and its applicability to other areas. However, key challenges include the scalability of resource-intensive engagement strategies such as dedicated project officers, heat pump champions and open homes.

## 12.3. Home Efficiency Hub Cherwell

### Home Efficiency Hub Cherwell project at a glance

**Location:**

- Northwest Bicester, Cherwell
- Target area selected based on grid capacity and suitability for heat pump deployment
- 59.7% of properties were detached or semi-detached, with a significant number of bungalows

**Project partners**:

- Lead organisation: City Science
- Delivery roles: National Energy Foundation (NEF), Growth Guides, Oxfordshire County Council, Scottish and Southern Electricity Networks (SSEN)
- Sub-contractors: Carbon Rewind, Hiber, TrustMark

**Proposition to customers:**

- Offered a ‘Prosumer Model’, combining heat pumps with solar PV and retrofit measures to improve efficiency and affordability.
- ‘One Stop Shop’ model, providing a single point of contact for customer support, financing, and technical advice.
- Customers received free home surveys and a Home Efficiency Plan outlining potential installations and financing options.
- Initially had a digitally focused engagement strategy, although in-person engagement was increased as the project progressed.

**Results:**

- 90% awareness of the project in the target area.
- 530 homes engaged through door-knocking, with 83 completing surveys.
- 23 home surveys completed, with 21 Home Efficiency Plans issued.
- 13 households progressed to the ‘Detailed Planning’ stage.
- No heat pump installations completed.

### The chosen project area

Northwest Bicester was selected due to its high suitability for heat pump deployment and strong grid capacity. The project team identified the following key factors:

- A **high proportion of detached and semi-detached properties** (59.7%) were thought to be better suited to accommodating heat pumps.
- Bungalows with large roof spaces offered **significant potential for solar PV** integration.
- **No prior large-scale heat pump deployment projects in the area**, meaning the project could test feasibility in a relatively untapped market.
- **Eligibility for grants from the 'Cosy Homes' programme** that is active in the area.

The project initially planned to collaborate with local community groups such as Deddington Environment Network and Community Action Group Network, but NEF later found these groups were not relevant to the target area.

### Target group area breakdown

| Target group | Total number of homes in target group | Number of homes targeted (25%) | Total number of homes engaged to date | Total number of homes with doorstep discussions | % of homes with doorstep discussions | Surveys completed | Surveys as % of total |
|---|---|---|---|---|---|---|---|
| # 1 | 56 | 14 | 56 | 46 | 82% | 1 | 2% |
| # 2 | 72 | 18 | 72 | 65 | 90% | 6 | 8% |
| # 3 | 87 | 22 | 87 | 74 | 85% | 4 | 5% |
| # 4 | 300 | 75 | 300 | 237 | 79% | 12 | 4% |
| **Total** | **515** | **129** | **515** | **422** | **82%** | **23** | **4%** |

### Project partners and their roles on the project

| Organisation | Role on project |
|---|---|
| **City Science** | Lead organisation, retrofit technical lead, project coordination |
| **National Energy Foundation (NEF)** | Place-based engagement lead, customer support and engagement |

| | |
|---|---|
| **Oxfordshire County Council** | Quality assurance and place-based advisory role |
| **Scottish and Southern Electricity Networks (SSEN)** | DNO partner, assessing grid capacity and monitoring network impact |
| **Growth Guides** | 'One Stop Shop' development, customer engagement, and marketing lead |
| **Carbon Rewind** | Surveyor and installer partner, responsible for conducting home surveys and system installations |
| **TrustMark** | Quality assurance partner, ensuring standards compliance |
| **Hiber** | Finance partner, providing long-term loan options for heat pump installations |

### The proposition to customers

The Home Efficiency Hub aimed to simplify and de-risk the heat pump adoption process by offering:

- **A 'One Stop Shop' model**
  - Integrated support through a dedicated online platform.
  - Free, independent advice on heat pumps and energy efficiency.
  - Pre-vetted MCS-accredited installers to ensure quality control.
- **Bundled heat pump, solar PV and battery offer (prosumer model)**
  - Customers received a personalised Home Efficiency Plan outlining heat pump, solar PV, battery and retrofit options.
  - Plans were designed to reduce energy costs over time, with estimated long-term savings depending on property type.
- **Access to financing and grants**
  - Low-cost loans were provided via Hiber, allowing repayments over several years.
  - The project aimed to complement the Boiler Upgrade Scheme (BUS) grant, but the financial offer was ultimately uncompetitive compared to market alternatives.

### Approach to customer engagement and recruitment

The Cherwell project's marketing and engagement strategy aimed to overcome scepticism by using a hyper-local and face-to-face approach:

- **Digital outreach, print outreach and branding**
    - The project initially focussed on a digital engagement strategy for the area, emphasising sign-ups through a dedicated website and extensive use of social media to target customers.
    - The Home Efficiency Hub branding was developed from scratch based on extensive user surveys, engagement and design. However, the new brand struggled to gain traction in the target community. The project was rebranded part way through to include Oxfordshire County Council’s logo to help improve confidence levels in the new service.
    - A dedicated online One Stop Shop provided project information and allowed customers to book home surveys.
    - Direct mail campaigns and flyers were distributed in the target area.
- **Door-to-door engagement and surveys**
    - 530 homes engaged via door-knocking.
    - 83 households completed in-person surveys, with 27% expressing interest in the Prosumer Model.
    - 68% identified high upfront costs as the biggest barrier to adoption.
- **Community engagement and events**
    - The project planned a heat pump demonstration with Daikin, but this did not take place, limiting the social proof of the technology in the area.
- **Challenges and drop-off rates**
    - While 90% of residents were found to be aware of the project in the area, only 13 progressed to the ‘Detailed Planning’ stage.
    - Many customers were found to be sceptical of the free home surveys, associating them with potential scams.
    - There was found to be a level of customer confusion over financing options.

## Key project learnings

1. **Overcoming consumer scepticism was a key barrier despite high levels of awareness raising**

    a. Many residents were sceptical of free home surveys, which impacted recruitment.

    b. A lack of visible early adopters and demonstration homes made it harder to persuade hesitant customers.

    c. The development of a new brand for the service offering 'The Home Efficiency Hub' made it hard to overcome consumer scepticism from scratch, as it had no track record of delivery. This was thought, by project partners, to be partly mitigated in later stages by the inclusion of the local authority endorsement.

    d. 90% of residents became aware of the project, demonstrating strong outreach.

    e. However, awareness did not translate into installations, highlighting the challenge of converting interest into action.

2. **Upfront costs were a major barrier and competitor offerings were lower cost**

    a. The financial offer of a low interest loan did not provide a compelling advantage over market alternatives such as Octopus Energy's heat pump offer.

    b. Bundling heat pumps with solar PV and retrofit measures improved the potential long term savings but increased the up-front capital costs significantly. Ultimately, in this project the long-term savings did not justify the upfront investment for the target homeowners.

3. **Installer recruitment and supply chain challenges**

    a. The project encountered significant difficulties in recruiting suitable installers. Only three responses were received to the tendering process despite outreach to 100 companies.

b. Installers' quotes for heat pump prices varied by up to 62%, leading to a high level of uncertainty for customers and difficulty in communicating costs up-front to customers.

c. Some installers lacked PAS 2035 compliance, posing a challenge for the project to manage quality assurance and standards.

4. **Grid integration was not a limiting factor**

   a. SSEN's monitoring confirmed that grid capacity was sufficient for large-scale deployment.

## Conclusion

Despite strong awareness-building efforts, the Home Efficiency Hub – Heat Pumps in Cherwell project ultimately did not recruit any customers for heat pump installations. Financial barriers, low consumer confidence, and installer availability issues prevented the project from achieving its objectives.

## 12.4. Heat Pumps for Friday Bridge

### Heat Pumps for Friday Bridge project at a glance

**Location:**

- Friday Bridge, Fenland, Cambridgeshire
- Target area selected based on grid capacity and suitability for high-density heat pump deployment
- The housing stock consisted primarily of detached (48.3%) and semi-detached (27.8%) homes, considered suitable for heat pumps

**Project partners:**

- Lead organisation: City Science
- Delivery roles: Cambridgeshire County Council (CCC), Fenland District Council, Peterborough Environment City Trust (PECT), Growth Guides, UK Power Networks (UKPN)Sub-contractors: Macbrook (Surveyor and Installer), Daikin (Heat Pump Manufacturer), TrustMark (Quality Assurance), Hiber (Finance Partner)

**Proposition to customers:**

- 'One Stop Shop' model: aimed at simplifying the customer journey through integrated engagement, financing, and technical support
- Bundled heat pump offer: included air source heat pumps (ASHPs), solar PV, and retrofit measures such as insulation
- Financial options: proposed low-interest loans via Hiber and a £7,500 contribution through the Boiler Upgrade Scheme (BUS)
- Free home surveys: conducted to assess property suitability and provide tailored retrofit plans

**Results**

- Community engagement: 377 households were engaged via door-knocking, with 108 engaging in doorstep discussions
- Home surveys: 15 households agreed to a home survey
- No heat pump installations were completed

### The chosen project area

Friday Bridge was deliberately selected to trial the deployment of heat pumps in a rural village location. Analysis of grid capacity showed a good level of head room to enable heat pump installation and the high proportion of larger, more energy efficient houses in the areas was thought to have high suitability for heat pump deployment. However, key challenges included:

- **A lack of early adopters in the area**: Few homeowners had prior awareness or interest in heat pumps
- **No existing local environmental groups**: Unlike other project areas, there were no active sustainability groups to champion the initiative
- **A limited understanding of the socio-demographic profile of the area:** The project did not conduct a socio-economic survey prior to engagement, which could have better tailored outreach efforts

### Target group area breakdown

| Target group | Total number of homes in target group | Number of homes targeted (25%) | Total number of homes with doorstep discussions | % of homes with doorstep discussions | Surveys completed | Surveys as % of total |
|---|---|---|---|---|---|---|
| 1 | 32 | 8 | 32 | 100% | 2 | 6% |
| 2 | 68 | 17 | 37 | 54% | 0 | 0% |
| 3 | 99 | 25 | 81 | 82% | 2 | 2% |
| 4 | 377 | 94 | 108 | 29% | 12 | 3% |
| **Total** | **576** | **144** | **258** | **44%** | **16** | **3%** |

### Project partners and their roles on the project

| Organisation | Role on project |
|---|---|
| **City Science** | Lead organisation, retrofit technical lead, project coordination |
| **Cambridgeshire County Council (CCC)** | Procurement lead, local authority endorsement |

| | |
|---|---|
| **Fenland District Council** | Quality assurance, support with community outreach |
| **Peterborough Environment City Trust (PECT)** | Consumer engagement lead |
| **Growth Guides** | 'One Stop Shop' development, customer engagement, marketing |
| **UK Power Networks (UKPN)** | Distribution Network Operator (DNO), assessing grid capacity |
| **TrustMark** | Quality assurance partner, ensuring compliance with installation standards |
| **Daikin** | Heat pump technology provider |
| **Macbrook** | Surveyor and installer |
| **Hiber** | Finance Partner, offering loan options for heat pump installation. |

### The proposition to customers

The **Heat Pumps for Friday Bridge** project aimed to simplify and de-risk heat pump adoption through:

- **Integrated support ('One Stop Shop')**
  - Digital platform providing information, financing, and technical advice.
  - Free home energy assessments worth £500.
  - Engagement through local authority branding to overcome scepticism.
- **Bundled offer (heat pump + solar PV + retrofit)**
  - Homeowners received tailored energy efficiency plans.
  - Additional measures like insulation to enhance performance.
  - Emphasis on long-term energy savings.

- **Financial support**
    - Low-interest loans via Hiber, initially explored through Lendology.
    - Despite financial offers, no customers proceeded to installation.

### Approach to customer engagement and recruitment

The project's marketing and engagement strategy focused on hyper-local, face-to-face outreach:

- **Community engagement and door-knocking**
    - 377 homes visited; 108 had in-depth discussions.
    - 15 households signed up for a free home survey.
    - Surveys delayed due to procurement issues.
- **Community events and partnerships**
    - Initial launch event at **Dottie's Tea Room** attracted 34 attendees, with 17 registering interest.
    - A second event saw no attendance, reflecting low demand.
    - Engagement with the Parish Council, though limited success.
- **Digital and print outreach**
    - **Website and social media**: Project page hosted on Action for Energy, targeted social media ads.
    - **Mail campaigns**: Letters sent with branding from Cambridgeshire County Council to overcome scepticism.

### Key project learnings

1. **Challenges and drop-off rates**
    a. Despite strong engagement, no households proceeded to installation.

b. Financial concerns: Customers were reported to perceive the up-front costs as high and the long-term savings as uncertain.

c. Scepticism about heat pumps: Householders reported concerns about heat pump performance, especially in older homes.

d. Communication delays: It was reported that on occasions, customers had to chase updates on survey visits and results due to issues managing the process between multiple partners.

2. **Consumer scepticism remains a barrier**

    a. Lack of local heat pump champions or demonstration sites limited social proofing of the technology in the area.

    b. Project partners reported that some customers perceived the project as a commercial sales pitch rather than a community initiative and were sceptical of the motivations.

    c. Even where heat pumps were offered to customers **for free**, there were no takers.

3. **Grid integration was not a barrier**

    a. UKPN confirmed sufficient grid capacity.

4. **Supply chain and installer issues**

    a. There were only two responses to the procurement tender for installers, limiting the project options for installation partners and costs. The procurement approach (via an existing county framework) may have **limited supplier competition.**

5. **Targeting and engagement approach could have been improved**

    a. The area was selected primarily for grid suitability rather than consumer readiness

    b. A **demographic assessment** before engagement could have improved outreach effectiveness

## Conclusion

Despite strong efforts in community engagement, the **Heat Pumps for Friday Bridge** project did not result in any heat pump installations. Key factors included:

- **Consumer scepticism and social proof**: No visible early adopters or working heat pump demonstrations.
- **Target area selection**: The project did not conduct socio-economic profiling, which may have led to low adoption in Friday Bridge.
- **Supply chain and installer limitations**: Delays in procurement and surveying impacted consumer confidence.

# 13. Appendix 5: Evaluation Methodology Statement for Heat Pump Ready Stream 1

## 13.1. Introduction

This appendix outlines the methodology employed in the evaluation of the four Stream 1 projects undertaken as part of the Heat Pump Ready (HPR) Programme. The projects—Bristol Heat Pump Ready, Oxford Clean Heat Street, Heat Pumps for Friday Bridge (Fenland), and Cherwell Home Efficiency Hub—each aimed to deploy heat pumps in local areas using innovative methodologies. The evaluation sought to assess the effectiveness, scalability, and challenges associated with these deployments, with findings intended to inform future initiatives and policy decisions regarding high-density heat pump deployment.

### Evaluation objectives

The evaluation was originally designed to achieve the following objectives:

- Assess the effectiveness of innovative methodologies employed in high-density heat pump deployment.
- Identify key enablers and barriers influencing project success.
- Evaluate consumer engagement strategies and their impact on adoption rates.
- Examine coordination efforts among project partners and external stakeholders.
- Capture lessons learned to support future deployment strategies.

The scope of the evaluation changed over the course of the programme to reflect the scope of the projects i.e. the evaluation was more focused on the feasibility and mobilisation phases than on deployment, as only one project proceeded to deployment.

## 13.2. Methodological approach

The evaluation followed a mixed-methods approach, incorporating both qualitative and quantitative data collection methods. The methodology was tailored slightly for each project to reflect specific delivery models and local contexts. The core elements of the evaluation included:

### Desk review of project documentation

A comprehensive review of project documents was undertaken to establish an understanding of the intended methodologies, delivery frameworks, and operational challenges. The review included:

- Project plans and feasibility studies
- Monthly reports and monitoring documents
- Change requests and stage-gate or close-out reports submitted to the Department for Energy Security and Net Zero (DESNZ)

### Stakeholder interviews

Semi-structured interviews were conducted with key project stakeholders, including lead organisations, project partners, subcontractors, and external agencies involved in the initiatives. These interviews aimed to capture perspectives on project implementation, coordination, and outcomes.

- Bristol: 12 in-depth interviews with core project partners and wider consortium members.
- Cherwell: 8 interviews with project partners, including the City Science team and local authorities.
- Fenland: 8 interviews with project partners, as well as 3 interviews with engaged households.
- Oxford: 11 interviews with project consortium members, alongside an additional interview with the Carbon Trust monitoring officer.

### Workshops with core consortium partners

Workshops were conducted with each project's core consortium members to facilitate discussions on key learnings, project challenges, and areas for future improvement. These workshops provided a forum for collaborative reflection and synthesis of findings.

### Consumer interviews (Oxford and Fenland Only)

Consumer interviews were conducted to assess perceptions of heat pumps, willingness to adopt, and the effectiveness of engagement strategies. These interviews provided insight into consumer decision-making processes and potential barriers to uptake.

### Analysis workshop with DESNZ

A dedicated analysis workshop was conducted with representatives from DESNZ to discuss emerging findings, validate insights, and explore policy implications. This step ensured alignment between project learnings and broader governmental priorities.

### Reporting and synthesis

Following data collection, a structured synthesis of findings was undertaken to identify common themes, project-specific insights, and key lessons learned. The final evaluation report integrated qualitative and quantitative evidence to provide a holistic assessment of the projects.

## 13.3. Limitations

While the evaluation methodology was designed to be robust, several limitations should be acknowledged:

- **Variability in consumer engagement**: Engaging consumers as part of the evaluation had originally been planned for the deployment phase, however only one project proceeded to deployment. Part way through the project, consumer interviews were also added for the mobilisation phase, however the timing of this was not conducive for effective evaluation (e.g. one project no longer held consumer contact data, another had launched a new heat pump deployment scheme so it was not possible to differentiate between the two initiatives).

- **Project-specific adjustments**: Each project followed a slightly different evaluation trajectory, meaning direct comparisons between projects must be interpreted with caution.

- **Limited consumer interviews**: Consumer interviews were only conducted for Oxford and Fenland, which may not fully represent end-user perspectives across all projects.

- **Project completion variability**: Some projects did not progress to full deployment, leading to a focus on mobilisation-phase learnings rather than end-to-end implementation assessment.