Agenda Item No: 6

Heat Pump Ready Project – Friday Bridge, Fenland

To:	Environment and Green Investment Committee
Meeting Date:	13th July 2023
From:	Executive Director of Place and Sustainability
Electoral division(s):	March North & Waldersey
Key decision:	Yes
Forward Plan ref:	2023/059
Outcome:	To test the feasibility for a pilot project aimed at supporting the installation of heat pumps in domestic properties
Recommendation:	Committee is asked to:

a) Approve the procurement of an installation contractor as set out in section 2.7 and to delegate authority for awarding and executing a contract for the provision of surveys and heat pump installation work in Friday Bridge to the Executive Director Place and Sustainability, in consultation with the Chair/Vice Chair of Environment and Green Investment Committee;

b) Note that there will be a full review of the proposed project prior to proceeding to any installations.

c) Note that a report will be presented to the Committee in November 2023 on the results of that review together with a recommendation on whether to proceed with the project or not.

Officer contact:
Name: Chris Parkin
Post: Community Energy Manager
Email: christopher.parkin@cambridgeshire.gov.uk
Tel: 01223 715909

Member contacts:
Names: Councillor Lorna Dupré and Councillor Nick Gay
Post: Chair/Vice-Chair of E&GI Committee
Email: lorna.dupre@cambridgeshire.gov.uk nick.gay@cambridgeshire.gov.uk
Tel: 01223 699831

1. Background

1.1 In 2021 the Government published its Heat and Buildings Strategy. This included the ambition to phase out the installation of gas boilers from 2035 for domestic and non-domestic properties. A national target of installing over 600,000 heat pumps per year by 2028 was set to support the UK Net Zero target of 2050.

1.2 To address barriers to domestic heat pumps, a Net Zero Innovation portfolio of £60million was established including the 'Heat Pump Ready' Programme. This is to support heat pump deployment including improving the customer journey. In March 2023 Government published its Powering Up Britain Strategy committing to rebalancing the costs of gas and electricity by end of 2024.

1.3 Cambridgeshire's 2021-22 Annual Carbon Footprint identifies homes as producing 14% of greenhouse gas emissions. Decarbonisation of domestic heating is essential to meet the Council's objective of a Net Zero county by 2045. Heat pumps are the key technology to achieve decarbonisation of space heating, with Air Source Heat Pumps (ASHP) being the most affordable and widely applicable type of heat pump for domestic use. However, installing ASHPs and other heat pumps is a far less straightforward process for consumers, and capital costs are higher, than a like for like boiler replacement.

1.4 A consortium led by City Science and including Cambridgeshire County Council and Fenland District Council, has secured two rounds of DESNZ Heat Pump Ready Funding. The £197K "Phase 1" funding was to develop an "integrated stakeholder model" to support greater uptake of heat pumps through a place-based approach and the Phase 2 funding is to develop the Heat Pump Ready project for Friday Bridge to trial and evaluate: a One-Stop-Shop for retrofit domestic heat pump installations and affordable finance models.

1.5 This report seeks authorisation for the procurement of contractor(s) for ASHP surveys, design and (subject to a further decision on whether to proceed with the project) installation for the Phase 2 project.

2. Main Issues

2.1 Heat Pump Barriers

2.1.1 Although it is often reported that heat pumps are only suitable for modern properties with a high level of insulation, the Energy Systems Catapult Electrification of Heat[1] project demonstrated successful installation and efficient operation of heat pumps (primarily ASHPs) in 742 homes covering a broad range of property types including pre-1919 solid wall properties. Only a minority (15%) of properties required insulation upgrades and Seasonal Performance Factors (median SPF was 2.80) did not vary significantly with property age. The majority of installations (93%) did include fitting larger radiators. A summary of the project is included at Appendix A.

2.1.2 Capital cost is however a significant barrier to ASHP installation. Average cost per property in the above study was £14,800. This is significantly higher than gas boiler installation costs (£1,400 - £3,500)[2]. Installation works are also more disruptive due to radiator replacement.

2.1.3 The complexity of the customer journey and finding trusted contractors are also significant barriers to heat pump installation. Many homeowners are uncertain whether a heat pump would be suitable for their property. A survey is required to inform the installation design. Multiple contractors could be required to survey, design the installation, install the heat pump, replace radiators, upgrade insulation (if desired) and install solar PV (often installed

alongside heat pumps to partly offset their electricity demand). The installer base is much more limited than for gas boilers and, with media reports of poor quality installations, homeowners may be nervous about finding an installer they can trust.

2.1.4 Heat pump installation also requires approval from the local electricity Distribution Network Operator. Although electricity network reinforcement costs no longer fall on the homeowner (from 1st April 2023 they are spread across everyone's electricity bills) there can be a significant delay awaiting approval.

2.2 DESNZ Heat Pump Ready Programme

2.2.1 The funding that City Science have secured for Heat Pumps for Friday Bridge is part of Stream 1 Phase 2 of DESNZ's Heat Pump Ready programme. The Friday Bridge project is one of four projects that DESNZ are funding under Stream 1 Phase 2. It aims to improve the customer journey and develop affordable finance.

2.2.2 Up to £1.8 million of grant has been awarded for Heat Pumps for Friday Bridge. This includes: funding for survey and installation design ("Phase 2a"); and £5,000 per property towards installation costs ("Phase 2b"). DESNZ requires projects to demonstrate that at least 25% of homes connected to one or more secondary (400/230 Volt) substations wish to install a heat pump in order to proceed to Phase 2b. Trial areas must be on the gas grid.

2.3 Friday Bridge Trial Area

2.3.1 Friday Bridge was identified as a suitable area by the Phase 1 feasibility study referred to in paragraph 1.4. Fenland was selected in order to address fuel poverty as part of the project. The feasibility study mapped the gas grid and secondary substation networks in Fenland. Friday Bridge was identified as the most suitable area following analysis of electricity network constraints, substation network sizes and property types.

2.3.2 The project aims to retrofit properties connected to up to seven secondary substations. The substations selected will depend upon demand from residents relative to DESNZ's 25% minimum deployment. If this uptake threshold is reached on all seven this would imply 146 homes being retrofitted. If the threshold is only reached for a single substation this implies around 30 homes being retrofitted.

2.4 Consortium

2.4.1 The Heat Pumps for Friday Bridge project is led by the consultant City Science. Both Cambridgeshire County Council and Fenland District Council are consortium members. Other consortium members are: Growth Guides who are leading on customer journey elements including developing the web based One-Stop-Shop; Lendology who are leading on developing and administering the loan offer; and Peterborough Environment City Trust (PECT) who are leading on resident engagement. UK Power Networks are also supporting the project with an assessment and delivery of any grid reinforcements required and Daikin is supporting the project by supplying ASHPs at bulk order prices.

2.5 Heat Pumps for Friday Bridge Approach

2.5.1 The project is developing a web-based, Council backed, One-Stop-Shop where Friday Bridge residents will be able to:

- Seek an initial assessment of their property's feasibility for an ASHP;
- Request a survey and proposal for ASHP installation plus supporting measures e.g.

solar PV, insulation, battery storage;

- Receive quotation documents from a contractor procured and vetted by the Council;
- Apply for affordable loan finance;
- Benefit from ASHP bulk purchase pricing;
- Book installation of an ASHP and supporting measures;
- Receive handover documents.

2.5.2 In some respects this is similar to offerings from the likes of Good Energy[3] and Octopus Energy[4]. These also consolidate the customer journey into a single portal. The Heat Pumps for Friday Bridge project offers the additional benefits of being from a trusted source, independent of commercial energy suppliers and providing access to affordable finance.

2.6 Project Timelines

2.6.1 Heat Pump Ready Stream 1 Phase 2 projects and funding are split into two sub-phases:

- Phase 2a runs until November 2023. It comprises scheme development, set up and customer recruitment. This includes establishing the One-Stop-Shop website, developing the affordable finance offerings for residents, home surveys and installation designs. There is no cost to the Council at Phase 2a. Survey and installation design costs are covered by DESNZ and City Science. Costs of the development of the One-Stop-Shop are funded by DESNZ.
- There will be a project review at the end of Phase 2a. We will report back on Phase 2a outcomes and seek a Committee decision on whether to proceed to Phase 2b. The consortium will also report to DESNZ at this stage gate on whether resident demand achieves the 25% threshold to release (£5,000/property) funding for Phase 2b.
- Phase 2b will run from December 2023 until December 2024. It will start with UKPN assessing and implementing any required secondary substation network reinforcement (December 2023 to June 2024). This will be followed by installation of ASHPs and supporting measures at customers' homes (July to December 2024).

2.7 Procurement

2.7.1 The project requires a contractor to survey properties and design installations (Phase 2a) and (subject to November stage gate decisions) to install ASHPs and supporting measures (Phase 2b). These may be one and the same contractor or separate contractors. We have conducted a mini-competition to procure these contractor(s) under the Cambridgeshire Council's framework for domestic energy efficiency upgrades. This framework is managed by City Council and we were closely involved in its development and tender evaluation. All contractors on the framework are accredited to:

- Trustmark[5], the Government endorsed quality scheme for works on domestic properties;
- MCS[6] for low carbon heating measures;
- PAS 2030[7] on installation, commissioning and handover of domestic energy efficiency measures.

2.7.2 Contractors must maintain these accreditations and deliver works to MCS and PAS 2035[8]

(Retrofitting dwellings for improved energy efficiency, specification and guidance) standards. This ensures quality of installation design and installation work. The Council will have contractual control over the contractors, including the ultimate sanction of removing them from the framework if they do not meet these requirements.

2.7.3 The estimated value of Phase 2a survey and design work is up to £420,000 depending on demand for surveys from residents. The estimated value of Phase 2b installation works is £450,000 - £2.1 million dependent on resident uptake. Contracts for installation works will be between the contractor and resident. Installation works will be funded by a combination of the £5,000 grant from DESNZ, low cost loans and capital contributions or alternative borrowing from the resident.

2.7.4 Because the value of the installation work is likely to exceed the £500,000 threshold, this procurement requires Committee approval. DESNZ grant funding milestones necessitate surveys, installation design and quotations taking place from July to October. To achieve this the Invitation to Tender (ITT) for this contract needed to be issued in advance of Committee approval. Advice on this was sought from Democratic Services and Procurement who confirmed that the ITT could be issued, with a clear caveat that installation work was not guaranteed and is subject to both Committee approval and DESNZ approval of Phase 2b.

2.7.5 The installation works element of the contract will only be utilised if the November stage gate report to Committee results in a Committee decision to proceed to installation works.

2.8 Loan

2.8.1 Lendology are leading on developing a loan offer. If, at the end of Phase 2a, there is resident demand for loans Lendology would administer loan provided at Phase 2b. Lendology are a Social Enterprise lender, established in 2003. They work with 15 Local Authorities to provide affordable finance for local residents for home improvements and have delivered £21 million in loan funding since 2005. This includes loans for energy efficiency and renewable energy works. Demand for loans will be evaluated and details of a proposed loan offer will be developed as part of Phase 2a. Typically Lendology loans are fixed interest, 5-15 year repayment terms (7-10 years being common) and secured against the property title.

2.8.2 There is complexity to resolve before we can confirm that affordable finance is viable at no cost or risk to the Council. We will work with the consortium to investigate options. The report to the November Committee will report on conclusions.

2.9 Boiler Upgrade Scheme (BUS) Funding

2.9.1 BUS grants towards the cost of heat pump installation are available for all residents in England and Wales. As per the Heat Pump Ready installation grant, these are set at £5,000 per property. The Heat Pump Ready and BUS grants cannot be combined. However, the BUS grant provides an alternative option if at the end of Phase 2a demand levels are significant, but not as high as the 25% threshold required to release the Heat Pump Ready Phase 2b funding. This helps manage the risk of creating an expectation with Friday Bridge residents that we cannot then deliver on if demand is not quite high enough.

2.10 Phase 2a Reporting & Stage Gate

2.10.1 We will report back to Committee in November with the Phase 2a conclusions on:

- The number of households that would like an ASHP installed;
- Other supporting measures that have been proposed;
- Total installation costs;
- Demand for loan funding;
- Feasibility of loan funding at no cost or risk to the Council;
- Whether the 25% secondary substations it has been achieved.

2.10.2 The November Committee report will seek a decision on whether to proceed to Phase 2b (installation).

3. Alignment with ambitions

3.1 Net zero carbon emissions for Cambridgeshire by 2045, and our communities and natural environment are supported to adapt and thrive as the climate changes

The following bullet points set out details of implications identified by officers:

- The project will support the delivery of this objective by making low carbon heating installation accessible to more residents in Friday Bridge;
- The learning and the One-Stop-Shop may enable the same or a similar offer to be rolled out more widely.

3.2 Travel across the county is safer and more environmentally sustainable

There are no significant implications for this ambition.

3.3 Health inequalities are reduced

The following bullet points set out details of implications identified by officers:

- Loans would carry a risk of widening health inequalities in fuel poor households if loan repayments are unaffordable;
- Lendology are experienced in managing these risks. In customer satisfaction surveys 71% of their customers report a positive impact on health & wellbeing;
- If Phase 2a confirms that there is a demand for loans and that these are feasible at no cost or risk to the Council, we will work with Health colleagues on a methodology to ensure that loan targeting is effective, those most in need are not excluded and that health inequalities are not widened.

3.4 People enjoy healthy, safe, and independent lives through timely support that is most suited to their needs

There are no significant implications for this ambition.

3.5 Helping people out of poverty and income inequality

The following bullet points set out details of implications identified by officers:

- The project may help alleviate fuel poverty. This will depend on specific installation costs, coefficients of performance and relative pricing of gas and electricity. We will have a better understanding at the end of Phase 2a of the first two points and on the proportion of properties where installation will deliver a net reduction in residents' costs.

3.6 Places and communities prosper because they have a resilient and inclusive economy, access to good quality public services and social justice is prioritised

There are no significant implications for this ambition.

3.7 Children and young people have opportunities to thrive

There are no significant implications for this ambition.

4. Significant Implications

4.1 Resource Implications

The following bullet points set out details of significant implications identified by officers:

- No significant costs to the Council are expected at Phase 2a. Grant funding will cover the setup of the One-Stop-Shop and the cost of surveys and installation design will be covered by City Science and grant funding.
- CCC staff costs are also covered by grant funding (28 days of staff cost at P2 level split evenly over Phases 2a & 2b).
- Phase 2b costs, including loan offer, will be assessed by Phase 2a work and reported to Committee in November.

4.2 Procurement/Contractual/Council Contract Procedure Rules Implications

The following bullet points set out details of significant implications identified by officers:

- A mini-competition has been conducted under the Cambridgeshire Councils' Domestic Energy Efficiency Retrofit Framework to appoint a survey and installation contractor(s).
- The Framework procurement followed an open, competitive, public procurement process.
- The value of the installation work exceeds the £500,000 threshold requiring Committee approval. The mini-competition documents made it clear that installation work is subject to approval by this Committee and to Phase 2a outcomes.

4.3 Statutory, Legal and Risk Implications

The following bullet points set out details of significant implications identified by officers:

- No statutory issues have been identified.

- The installation contractor has been procured on a call-off basis and contracts for installation work will be between the contractor and resident, although the contractor will be required to fully comply with the terms of the Framework.
- There is reputational risk if the installation contractor or equipment under-performs. Procurement of a Trustmark, MCS and PAS accredited contractor helps manage this risk. Works will be subject to a 12 months workmanship warranty. The project will be evaluated post installation by the Carbon Trust and IPSOS, including a review of heat pump performance. Use of heat pumps from a reputable supplier (Daikin) also helps manage performance risk.
- There is also a reputational risk of creating expectation at Phase 2a that ASHPs will be installed which could be compromised by failure to achieve DESNZ's 25% uptake threshold. This conditionality will be included in communication to residents. If the threshold is not reached, but there is nevertheless significant demand, installations could still proceed under Boiler Upgrade Scheme grant funding, subject to Committee decision in November.

4.4 Equality and Diversity Implications

The following bullet points set out details of significant implications identified by officers:

- Friday Bridge is within the third decile on the Indices of Multiple Deprivation i.e. it is within the top 30% most deprived areas in England, but not within the top 20%. The project could therefore impact on socio-economic inequalities.
- Heat Pumps for Friday Bridge will make heat pumps more affordable to install. Heat pump running costs can be higher or lower than a gas boiler depending on the property and relative prices of gas and electricity. Residents will be provided with projected energy bill impacts in the heat pump installation proposals and are under no obligation to accept proposals. Installations are more likely to go ahead in cases where a bill saving is projected. The policy should therefore result in energy bill savings for residents. Contractors are prohibited under the Framework from hard-selling proposals.
- If the Government's proposed rebalancing on gas and electricity prices takes place from late 2024 this is likely to make heat pumps cheaper to run than gas boilers for most properties.
- An EqIA e-form has been completed and is attached.

4.5 Engagement and Communications Implications

The following bullet points set out details of significant implications identified by officers:

- A programme of community engagement will be taking place under Phase 2a.
- PECT are the community engagement lead and have experience of engaging with local residents on environment and energy efficiency issues.

4.6 Localism and Local Member Involvement

- Local Members have been made aware of the project and will be kept informed of progress as it moves forward.

4.7 Public Health Implications

There are no significant implications within this category.

4.8 Climate Change and Environment Implications on Priority Areas (See further guidance in Appendix 2):

4.8.1 Implication 1: Energy efficient, low carbon buildings.
Positive Status:
Explanation: heat pumps are an energy efficient low carbon source of heating. Because they supply, on average, 2.8 units of heat per unit of electricity they use, they are 68% less carbon intensive than gas boilers even at current electricity grid carbon intensity. They will become even lower carbon as the grid is further decarbonised.

4.8.2 Implication 2: Low carbon transport.
Neutral Status:
Explanation: No impact on transport

4.8.3 Implication 3: Green spaces, peatland, afforestation, habitats and land management.
Neutral Status:
Explanation: No impact on green spaces or land management.

4.8.4 Implication 4: Waste Management and Tackling Plastic Pollution.
Negative Status:
Explanation: Installation work will give rise to waste from boilers and radiators removed and packaging from new equipment installed. The contractors will collect and recycle waste as far as possible to minimise impacts.

4.8.5 Implication 5: Water use, availability and management:
Neutral Status:
Explanation: No impact on water use.

4.8.6 Implication 6: Air Pollution.
Neutral Status:
Explanation: In principle replacement of fossil fuel boilers with heat pumps has a small impact in reducing emissions of air pollutants, in particular NOx. However, residential, commercial & public sector combustion is a small contributor to NOx emissions nationally (12%)[9] and 70% of NOx at NO_2 exceedance locations originates from road transport[10].

4.8.7 Implication 7: Resilience of our services and infrastructure, and supporting vulnerable people to cope with climate change.
Positive Status:
Explanation: The project will support Friday Bridge residents with replacing fossil fuel boilers as part of climate change action. Subject to confirmation by Phase 2a, the project may have a positive impact on energy costs for those in fuel poverty.

Have the resource implications been cleared by Finance? Yes
Name of Financial Officer: Mike Falconer & David Parcell

Have the procurement/contractual/ Council Contract Procedure Rules implications been cleared by the Head of Procurement and Commercial? Yes
Name of Officer: Clare Ellis

Has the impact on statutory, legal and risk implications been cleared by the Council's Monitoring Officer or Pathfinder Legal? Yes
Name of Legal Officer: Emma Duncan

Have the equality and diversity implications been cleared by your EqIA Super User?
Yes
Name of Officer: Sheryl French

Have any engagement and communication implications been cleared by Communications?
Yes
Name of Officer: Kathryn Rogerson

Have any localism and Local Member involvement issues been cleared by your Service Contact? Yes
Name of Officer: Sheryl French

Have any Public Health implications been cleared by Public Health?
Yes or No
Name of Officer: Iain Green

If a Key decision, have any Climate Change and Environment implications been cleared by the Climate Change Officer?
Yes
Name of Officer: Emily Bolton

5. Source documents

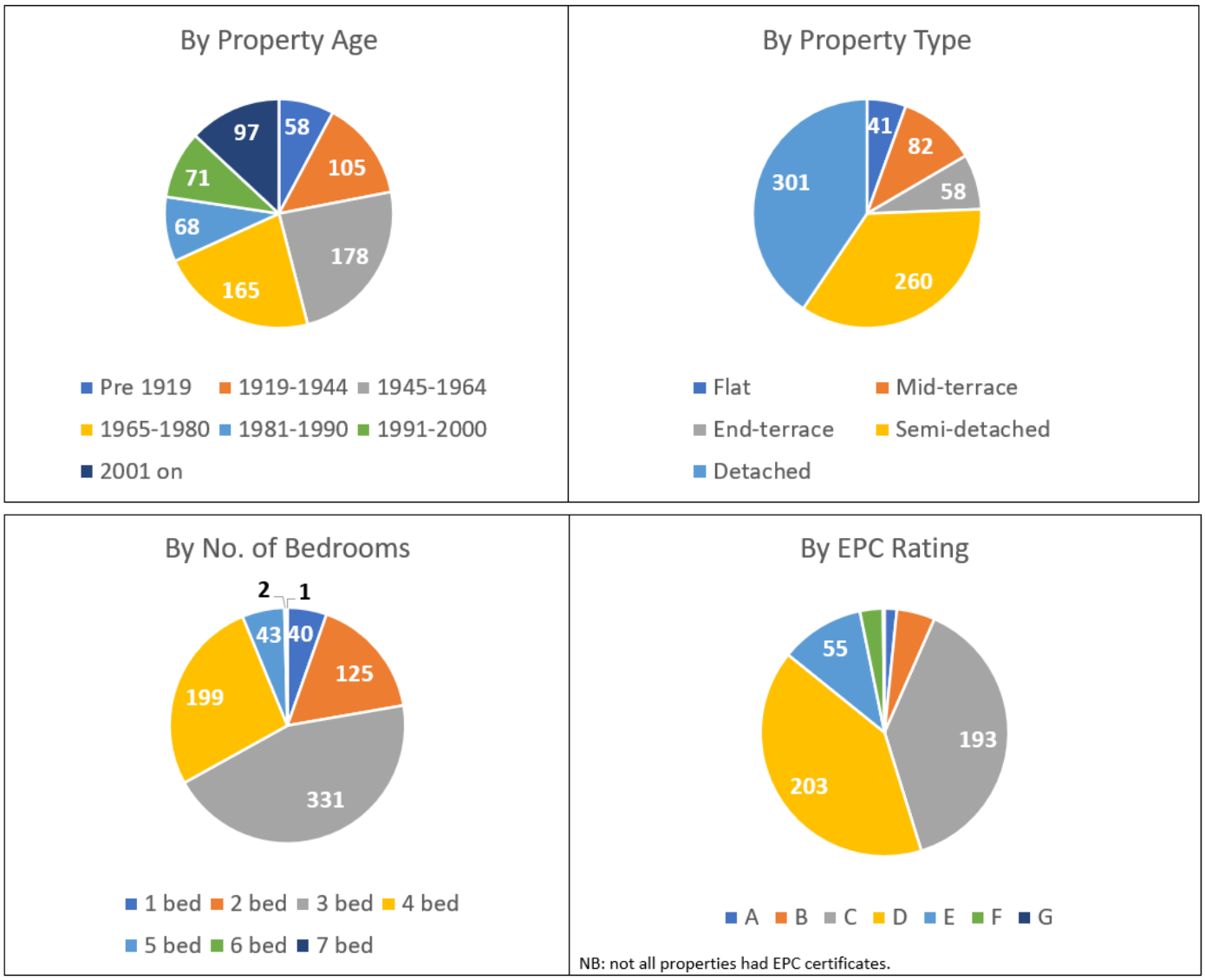
5.1 Source documents

1. https://es.catapult.org.uk/project/electrification-of-heat-demonstration/
2. https://www.theheatinghub.co.uk/guide-to-boiler-installation-costs#:~:text=Updated%20for%202021.,fitted%20installation%20cost%20scenarios%20below.
3. Get a heat pump from Good Energy
4. https://octopus.energy/get-a-heat-pump/
5. https://www.trustmark.org.uk/
6. https://mcscertified.com/
7. https://www.trustmark.org.uk/tradespeople/how-to-become-pas-mcs-certified#questions
8. https://knowledge.bsigroup.com/products/retrofitting-dwellings-for-improved-energy-efficiency-specification-and-guidance-1/standard/preview
9. https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2210251052_DA_Air_Pollutant_Inventories_2005-2020_FINAL_v1.2.pdf (see Appendix F1)
10. Emissions of air pollutants in the UK – Nitrogen oxides (NOx) - GOV.UK (www.gov.uk)

Appendix A – Electrification of Heat Project

The Electrification of Heat UK Demonstration Project is a Government funded study to better understand the practical feasibility of large scale retrofit of heat pumps into existing UK homes. Heat pumps were installed in 742 properties by three delivery contractors. The study examined the survey, design and installation process and is monitoring the performance of the heat pumps after installation. The study includes reports on the installation work and an interim report on operational performance of the heat pumps up to August 2022. Further performance monitoring is ongoing and a final performance report will be published after September 2023.

Heat pumps were installed across the range of typical UK property types, ages and sizes. The breakdown of the 742 installations by property age, type, size and Energy Performance Certificate (EPC) rating is shown below.



The heat pumps installed were primarily ASHPs: 41% were low temperature ASHPs; and 33% were high temperature ASHPs i.e. ASHPs capable of providing heat at over 65°C flow temperature (equivalent to a condensing boiler). ASHPs installed ranged from 5 kW to 16 kW in capacity, the most common size was 8.4 kW. Only 5% of properties had Ground Source Heat

Pumps installed. In almost all cases (93%) new, larger radiators were installed in addition to the heat pumps, however only a minority of properties (15%) had insulation upgrades (mostly loft insulation) at the same time. Average installation costs were £14,800, inclusive of radiator upgrade costs. Installations typically took 2-4 days and involved 2 installers and 1 electrician. In cases where approval from the local electricity Distribution Network Operator (DNO) was required for the installation, this took up to 11 weeks in many cases. DNOs are, however, reported to have made improvements to speed up their processes since the study.

The Seasonal Performance Factor (SPF) of a heat pump is the ratio of kWh heat it delivers to kWh electricity it consumes over a year. This is an indication of the operational efficiency of the heat pump, higher SPFs representing better performance. Median SPFs for the ASHPs installed was 2.80. This includes electricity consumed by any backup or immersion heaters included in the systems. Interestingly there was no significant difference in SPF across the range of property ages (Median SPF for the pre-1919 properties was actually slightly higher at 2.94). SPF was higher for systems where a lower flow temperature was set, however, SPFs for low temperature and high temperature ASHPs were 2.74 and 2.89 respectively. The counter-intuitively higher SPF for the high temperature heat pumps is “likely due to a combination of higher performing refrigerants and weather compensation controls meaning that they operate at lower temperatures most of the time”. SPFs were around 0.3 higher than those found in a study (Final report on analysis of Heat Pump Data from the Renewable Heat Premium Payment scheme) published in early 2017, suggesting that there have been significant improvements in the performance of heat pump installations over the past 5-6 years.

In the majority of cases ASHP installations complied with noise requirements specified in MCS standards and permitted development rights with no special measures. Noise enclosures or barriers were only necessary on 4% of installations. Almost half of the heat pumps installed were low noise models.

Some properties (12% of those surveyed) were deemed unsuitable for retrofit in this study for a variety of reasons. 7% required heat pumps larger than the largest units (18 kW) available to the study, 4% were excluded on thermal comfort grounds and 4% were deemed to be unaffordable. Some were excluded due to lack of external space (8%) for an ASHP, or available space being too close to neighbours (5%) or due to lack of internal space for a hot water cylinder (2%). Properties with microbore (<15mm diameter) pipework in their central heating were also noted as unsuitable without full replacement of pipework.

The study concludes that ASHPs are suitable not only for the most modern and energy efficient homes, but can be installed and operate efficiently in all typical UK property types, ages and sizes. In most cases heat emitter upgrades are required as part of the install. Insulation upgrades were not commonly required although will reduce heating demand and therefore running costs.

Solid-wall property suitability for ASHPs

The project reports don’t explicitly discuss building construction methods. However, a full database of properties surveyed and installations has been published alongside the reports. This does record the building construction methods. In total 62 solid-walled properties were retrofitted with heat pumps, 24 of these existing solid wall insulation, the remaining 38 had no wall insulation and solid wall insulation was not fitted as part of the ASHP installations. Installation contractors triaged 50 solid wall properties out of the programme for technical reasons, 9 of these were due to concerns over whether the ASHP would achieve thermal comfort, 21 were due to large enough ASHPs not being available to the programme, the remainder were due to noise, space or cost

constraints. The proportion of solid wall properties triaged out due to technical feasibility reasons was 31%. This compares to a 16% rate across properties of all construction types. This suggests installation of ASHPs in solid wall properties is more technically challenging than average. However, ASHP installation was feasible on solid wall properties in the majority of cases.