Final Report
March 2024

Process Evaluation of North East & Yorkshire Retrofit Activities: Final Report

steer economic development

north east & yorkshire NET ZERO HUB

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Appendices

1 Introduction

1.1 The North East and Yorkshire (NEY) Net Zero Hub - henceforth, the Hub - is at the centre of the North East and Yorkshire region's ambitious efforts to drive a low-carbon, clean-growth future. Funded by the former Department of Business, Energy and Industrial Strategy, BEIS (now Department for Energy Security and Net Zero, DESNZ – from here on, referred to as the Department), the Hub is one of five of its kind across the country, all focusing on helping the UK to reach Net-Zero carbon emissions by 2050.

1.2 The Hub has commissioned Steer Economic Development (Steer-ED) and partners from Qa Research, Carbon Co-op and Dr Marina Topouzi (University of Oxford) to deliver a mixed-methods process evaluation of housing retrofit within the region. Over 6,800 homes across the North East and Yorkshire have received retrofit measures under one or more Government schemes since 2020. The evaluation is intended to provide a better understanding of experiences of delivery and lessons learnt from a range of perspectives. The following schemes are in scope of this evaluation:

- Local Authority Delivery (LAD) Phase 1A and 1B, delivered directly by Local Authorities (LAs);
- LAD Phase 2, administered by the Hub;
- Sustainable Warmth Competition (comprising LAD Phase 3 and Homes Upgrade Grant 1); and
- the Homes Upgrade Grant (HUG) 2, which is ongoing.

1.3 Chapter 3 provides an overview of these schemes in greater detail.

Overview of the Hub

1.4 The Hub programme was launched in 2017, following the government's Clean Growth Strategy,[1] with the establishment of Hubs in five regions across the country: North East & Yorkshire; North West; Midlands; South East; and South West. The NEY Hub covers five Mayoral Combined Authority (MCA) areas: and one LEP/Combined Authority (CA) Hull and East Yorkshire LEP, York & North Yorkshire MCA, North of Tyne MCA (in advance of the North East MCA coming into being), Tees Valley CA, West Yorkshire CA and South Yorkshire MCA. It also covers 31 local areas).

The Hub delivers a range of projects and programmes, all focused on helping the UK reach Net-Zero carbon emissions by 2050. As part of one of the Hub's programmes, Local Authority Led Housing Retrofit, the Hub administered LAD2 funding and supported LAs to deliver retrofit measures. The Hub was not directly involved in LAD Phase 1A and 1B, SWC or HUG 2.

[1] https://www.gov.uk/government/publications/clean-growth-strategy

Context of the evaluation

The retrofit challenge

1.5 Like all nations, the UK faces an immediate imperative to decarbonise its economy. In 2022, UK greenhouse gas emissions were estimated to be 450 million tonnes of carbon dioxide equivalent (tCO_2e), including the UK's share of international aviation and shipping[2], which equates to approximately 6.7 tCO_2e per capita.

1.6 There is widespread agreement that the energy efficiency of the UK's existing housing stock needs to be improved significantly to meet the UK's 2050 Net Zero targets and support the transformation of the energy system. Whilst there has been major progress towards decarbonisation of the power sector, the UK's housing stock continues to be seen as amongst the least energy and carbon-efficient in Europe. Almost 60% of housing in England was built before 1965 when a basic level of thermal insulation was first required by Building Regulations. Currently, residential buildings account for 30% of the UK's energy demand and as much as 25% of the UK's carbon emissions.

1.7 Since 1991, the rate of construction of new homes has been approximately 0.5% of the stock per year, with demolition an order of magnitude lower still. As such, most new builds add to, rather than replace the existing housing stock. Consequently, it is estimated that 80-85% of homes occupied in 2050 are likely to be those currently standing today. Given this, retrofitting, defined as a '*construction approach involving the action of introducing* [retrofitting] *new materials, products and equipment into an existing building with the aim of reducing the use of energy of the building*'[3]of the existing housing stock is therefore essential as part of any strategy for improving energy efficiency and reducing carbon emissions. Retrofit is also important to future proof buildings to extreme weather conditions and fuel prices, improve comfort and reduce costs[4]. Within the wider Net Zero strategy landscape, the UK Government has included a target of achieving an Energy Performance Certificate (EPC) rating of C or above by 2035 as a means of accelerating decarbonisation of the domestic building sector.

A means to tackling fuel poverty

1.8 In addition to reducing domestic energy demand, retrofitting has the potential to address wider sustainability goals such as occupant health and wellbeing, including reducing fuel poverty rates. Fuel poverty is broadly defined as the *inability to afford an acceptable level of warmth in the home* and is determined by three principal factors: the energy efficiency of the property, energy costs, and household income.

1.9 In England, fuel poverty is currently measured using the Low-Income Low Energy Efficiency (LILEE) indicator[5] which classifies a household as fuel-poor if:

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[2] Climate Change Committee (2023) Progress Report to Parliament. Climate Change Committee, London, UK. Retrieved from: **https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/**

[3] **Baeli, M. (2013) Residential Retrofit: 20 Case Studies. RIBA Publishing, London, UK.**

[4] Eyre, N., et al. 2023. Fabric first: is it still the right approach? Buildings and Cities. 4(1), p.965–972. Retrieved from: **https://journal-buildingscities.org/articles/10.5334/bc.388**

[5] Department for Energy Security and Net Zero (2021) Sustainable Warmth: Protecting Vulnerable Households in England. Department for Energy Security and Net Zero, London, UK. Retrieved from: **https://www.gov.uk/government/publications/sustainable-warmth-protecting-vulnerable-households-in-england**

- Their home has a Fuel Poverty Energy Efficiency Rating (FPEER)[6] of band D or below; and
- After subtracting their modelled energy costs and housing costs, their residual income is below the poverty line.

1.10 As of March 2023, fuel poverty rates were estimated to be 13% across England, with the North East and Yorkshire having some of the highest fuel poverty rates in the country. Of those households living in fuel poverty in the region, 90% are in a property with an Energy Performance Certificate (EPC) rating of band D or below. With recent fluctuations in energy prices, a recent poll by National Energy Action (NEA) indicated that 1 in 4 UK adults find it difficult to pay their energy bills.

1.11 The most vulnerable groups to fuel poverty include older people (65 and older), single parents with dependent children, families who are unemployed or on low income, children and young people, pregnant people, people with disabilities, people with existing illnesses and long-term conditions, and single unemployed people. Fuel-poor households are more likely to live in energy inefficient homes compared to non-fuel-poor households. In particular, private tenants tend to be at a higher risk of severe fuel poverty due to lower incomes compared to owner occupiers and because they tend to live in less energy efficient homes compared to social housing tenants.

1.12 A wide body of literature exists linking fuel poverty and living in a cold home to poor physical and mental health. For example, the Marmot Review into the health impacts of cold homes and fuel poverty found a strong association between cold temperatures, cardiovascular and respiratory diseases, and minor illnesses such as colds and flu.[7] Fuel poverty and living in a cold home have also been linked to excess winter deaths, the phenomenon where frequency of death is higher in winter months than at other times of the year. In the UK, it has been estimated that a fifth of excess winter deaths are attributable to the coldest quarter of homes and that approximately 10% of excess winter deaths are directly attributable to fuel poverty.[8] In addition to the physical health impacts of fuel poverty, there are a broad range of impacts on occupant mental health. Living in fuel poverty can be stressful for many reasons (such as continued thermal discomfort and financial worries) and there is evidence internationally highlighting the negative impact of fuel poverty on mental health and wellbeing.

1.13 There can also be a significant amount of stigma attached to those living in fuel poverty. For example, occupants report feeling embarrassed by their home to accept visitors, which can leave people vulnerable to loneliness and social isolation. A recent study reported that embarrassment may also prevent people seeking assistance to improve their situation either

[6] Fuel Poverty Energy Efficiency Rating is based primarily on the Government's Standard Assessment Procedure (SAP) for assessing the energy performance of domestic properties. Building on SAP, the FPEER methodology also accounts for the impact of policy interventions that directly affect household energy costs (for example., Warm Home Discount). In the same way as SAP, the methodology generates an energy efficiency rating from 0 (lowest) to 100 (highest). This rating is then translated into an energy efficiency 'Band' from G (lowest) to A (highest). This is analogous to the SAP rating methodology which is used to generate an overall energy efficiency Band (also from G to A) for Energy Performance Certificates.

[7] Marmot Review Team. 2011. The Health Impacts of Cold Homes and Fuel Poverty. London: Institute of Health Equity. Retrieved from : **https://www.instituteofhealthequity.org/resources-reports/the-health-impacts-of-cold-homes-and-fuel-poverty/the-health-impacts-of-cold-homes-and-fuel-poverty.pdf**

[8] Alice Lee, Ian Sinha, Tammy Boyce, Jessica Allen, Peter Goldblatt. 2022. Fuel poverty, cold homes, and health inequalities. London: Institute of Health Equity. Retrieved from: **https://www.instituteofhealthequity.org/resources-reports/fuel-poverty-cold-homes-and-health-inequalities-in-the-uk/read-the-report.pdf**

from friends and relatives or through support agencies. Other wider social impacts of living in a cold home include tension amongst household members and restricted use of living space[9].

1.14 Energy efficiency interventions such as retrofitting are considered the simplest ways of tackling fuel poverty and preventing associated negative health, wellbeing, and socio-economic consequences. For example, the UK Green Building Council (UKGBC) estimated that for every £1 spent on retrofitting fuel-poor homes, an estimated £0.42 is saved in NHS spending[10].

Retrofit Delivery in the UK

1.15 The delivery of retrofit activity within the UK through various government-funded programs and competitions has been notable for its dynamic yet somewhat fragmented nature. These initiatives, each with their own distinct set of criteria, have injected vitality into the retrofit landscape, promoting innovation and engagement among stakeholders. However, the short, intensive bursts of activity have also posed challenges in terms of sustained momentum and comprehensive coverage. While these initiatives have undoubtedly spurred progress in retrofitting efforts, there remains a need for greater coordination and alignment to ensure a cohesive, long-term approach that maximises the impact of such investments and addresses the complexities of retrofitting at scale. This evaluation delves into the delivery of some of these retrofit schemes and draws out key learnings for retrofit delivery in the UK.

Purpose of the evaluation

1.16 The key aim of this process evaluation was to understand the lived experience of those involved with the LAD1, LAD2, and HUG2 programmes, including:

- Homeowners and occupiers benefitting from retrofit activity;
- Local Authorities and other public bodies delivering schemes; and
- Supply chain stakeholders, including turnkey providers, installers and retrofit coordinators.

1.17 The primary objective of the research was to provide emerging findings and develop forward-looking recommendations around the 'legacy' of retrofit activities and to synthesise findings across stakeholders to create a cohesive narrative around 'what works'. This includes reflection on how findings should be used to inform the development of future programmes as well as informing the Hub's workstreams of retrofit support.

1.18 Funding for this evaluation was provided by the Department. The Department will be a recipient of the final outputs, along with the Hub's Board, and findings will be used to inform future retrofit programme priorities.

1.19 Reflecting the primary objective of the evaluation, the key evaluation questions for the study were:

- What was the beneficiary experience of the engagement stage?
- What was the beneficiary experience of the installation of measures?

[9] Sawyer, A., Sherriff, N., Bishop, D. et al. 2022. "It's changed my life not to have the continual worry of being warm" – health and wellbeing impacts of a local fuel poverty programme: a mixed-methods evaluation. BMC Public Health 22(786). Retrieved from: **https://doi.org/10.1186/s12889-022-12994-4**

[10] UK Green Building Council (2017) Regeneration and Retrofit Task Group Report. UK Green Building Council, London, UK. Retrieved from: https://www.ukgbc.org/wp-content/uploads/2017/09/08498-Regen-Retrofit-Report-WEB-Spreads.pdf

- What has been the beneficiary experience of living with the measures installed?
- What was the approach to tendering, bid writing and procurement of suppliers?
- What was the approach to beneficiary engagement?
- What was the delivery approach adopted by strategic delivery stakeholders? i.e., in-house or managing agent or a combination?
- Would the organisation undertake the same retrofit programme again?
- What monitoring and evaluation activity was undertaken?
- What was the supply chain experience of the design and installation stages?
- What was the supply chain's understanding of PAS/TrustMark standards?
- What advice and aftercare was the organisation contracted to deliver?
- What opportunities exist for the Hub to create and add value within the provision of support for housing retrofit, both in terms of providers and the supply chain?
- What are the main recommendations to be fed back to Government?

1.20 A full table of these key research questions, including research sub-questions, can be found in Appendix A. These are based on research questions set out in the commissioning brief and were further developed by Steer-ED.

Structure of this report

1.21 The remainder of this report is structured as follows:

- **Chapter 2: Methodology** describes the research approach and methods employed;
- **Chapter 3: The Schemes** presents the scheme details, Theory of Change and stakeholder journey maps of the retrofit schemes;
- **Chapter 4: Tendering, Bid Writing, and Procurement of Suppliers** examines the processes, communication, resources, and partnerships involved in the tendering and procurement phases of retrofit programmes;
- **Chapter 5: Beneficiary Engagement** focuses on data used to inform engagement strategies, promotion strategies, and the beneficiary experience during engagement;
- **Chapter 6: Delivery and Installation** investigates fraud mitigation measures, aftercare provision, governance, communication, supply chain experience, and beneficiary experiences during installation;
- **Chapter 7: Post-installation & Monitoring** analyses the beneficiary experience of post-installation and the monitoring and evaluation processes in place; and
- **Chapter 8: Recommendations** provides overarching recommendations based on the findings and analysis presented in the report.

2 Methodology

Introduction

2.1 This chapter outlines the evaluation methodology adopted to answer the research questions set out in Chapter 1, as well as any associated limitations. Key methods included:

- A desk review to develop the Theory of Change and journey maps;
- Beneficiary fieldwork through interviews and focus groups;
- Fieldwork with strategic delivery and supply chain stakeholders; and
- The synthesis and triangulation of evidence from these sources.

2.2 Methodological considerations highlight the rationale behind the selected methods and limitations. These methods are described in detail below.

Summary of methods

Desk review & development of journey maps and Theory of Change

2.3 We conducted a desk review of scheme documentation and existing literature to refine the evaluation approach and develop an overarching Theory of Change for retrofit activities in the region and journey maps for key stakeholders. The review of literature (see Appendix B), examined challenges, incentives, and performance of the UK's existing retrofit schemes, alongside strategies used by other countries to address these challenges. Table 2-1 summarises the key findings from the literature review and their implications for this evaluation.

Table 2-1: Key Findings and Implications

Finding	Implication
It is important for LAs to work with other actors in the supply chain and there is a need for knowledge exchange between all actors in the retrofitting process.	Topic guides for all stakeholders included lines of enquiry related to relationships between stakeholders.
Building a rapport with clients/homeowners/residents is important.	Beneficiary survey and topic guides included lines of enquiry related to relationships with LAs and installers.
Demanding delivery timescales for schemes means delivery stakeholder may have insufficient time to plan, promote and implement a scheme.	Delivery stakeholder topic guide included lines of enquiry related to timescales and the barriers toward timely delivery.
Problems among residents can arise due to poor handover and lack of aftercare post-installation.	Topic guides included lines of enquiry related to after-care and post-installation to explore how residents are supported to adapt to living with measures.

Retrofitting can be very disruptive to residents.	Topic guides included lines of enquiry related to experiences of the installation process.
'Windows of opportunity' for when residents will want to retrofit are important.	Beneficiary interview and focus group sampling ensured a mix of life stages to understand different experiences of retrofit.
Good communication between design and installation teams are important in avoiding installation failures.	Supply chain topic guides included lines of enquiry related to communications between supply chain roles.
There are not enough skilled individuals in the retrofit supply chain.	Supply chain topic guides included lines of enquiry related to gaps in skills and training.
SMEs who tend to deliver retrofitting often fall outside of trade organisations and accreditation schemes.	Supply chain topic guides included lines of enquiry related to barriers to accreditation.

Source: Steer-ED, 2024

2.4 Scheme documentation, including policy documents and monitoring data, provided insights into inputs and desired outputs of the programmes. Journey maps and a programme Theory of Change were developed by reviewing documentation on retrofit schemes and retrofit guidance. This provided insights into the typical stages that stakeholders go through in retrofit delivery, the inputs and desired outputs of the schemes. Documents reviewed included:

- LAD1b Guidance for Local Authorities;
- Home Upgrade Grant 2 Delivery Guidance for Local Authorities;
- Home Upgrade Grant 2 Guidance for Local Authorities;
- Sustainable Warmth Competition Guidance for Local Authorities;
- The Local Authority Domestic Retrofit Handbook[11]; and
- Other guidance documents and example journey maps that had been made previously.

2.5 The evaluation team collaborated with the Hub team throughout the process. First, we presented a first draft of each of the Theory of Change and journey maps for initial comments. We then developed and presented more detailed versions which went through a process of more detailed comments and discussion with the Hub. The final Theory of Change and stakeholder journey maps are discussed in Chapter 3.

Beneficiary fieldwork

Computer Assisted Telephone Interviews with beneficiaries

2.6 Qa Research conducted 414 Computer Assisted Telephone Interviews (CATIs) with LAD2 beneficiaries. Contact details of LAD2 beneficiaries who had consented to take part in an evaluation were shared by the Hub. From this database, a criterion was developed to ensure our beneficiary sample was representative of key factors relevant to the research. Specifically, the sample ensured representation across retrofit measure types, property type, and area (Local Authority). Details of the sample criteria and the achieved sample is presented in Appendix C.

[11] Local Partnerships (2023) Local Authority Domestic Retrofit Handbook – 2023 Edition. Local Partnerships, London, UK. Retrieved from: **https://localpartnerships.org.uk/resources/domestic-retrofit-handbook/**

2.7 Interviews were conducted in two waves to capture changes in attitudes over time and with seasonality. The first wave (n=150) was conducted in August 2023 and the second wave (n=264) was conducted in January 2024. In order to capture whether respondents' opinions changed according to the time of year, a subset of Wave 1 respondents (n=75) were also included within Wave 2. The CATI consisted of primarily closed questions to gather key metrics such as consumer satisfaction, ratings of the installation experience and aftercare. The CATI also included open questions to allow for the exploration of the customer journey in more depth. The full CATI questionnaire is presented in Appendix D.

Qualitative in-depth interviews and focus groups with beneficiaries

2.8 Qa Research completed a further 50 in-depth interviews over the two waves and a further four online focus groups (conducted during Wave 2) to explore the beneficiary experience. Participants were recruited through the CATIs at each wave using a representative sampling criterion which ensured representation of all measure types, LAs, tenure type, gender, life stage, and overall rating of retrofit experience (as reported in the CATI). The focus groups were grouped by measure type (for example, Solar PV, Cavity Wall Insulation, Air Source Heat Pumps, etc.) to explore the effects of types of measures on beneficiary experience. Moreover, these focus groups were also used to test recommendations that emerged from the Wave 1 fieldwork with beneficiaries. Appendix E details the sample of respondents involved in the interviews and focus groups. The majority of these interviews (42 out of 50) were conducted online or via telephone. Eight of these interviews were enhanced interviews and were conducted face-to-face at the resident's home, including a walkthrough of the household and review of the measures (where possible). Drawing on interview evidence and the home visits, six beneficiary case studies were produced. These are included in Appendix I.

Strategic delivery stakeholder fieldwork

Depth interviews and focus groups with strategic delivery stakeholders

2.9 A series of interviews were conducted with strategic delivery stakeholders such as representatives from the Hub and from Local Authorities that had been involved in delivering retrofit schemes. In total, we held 14 interviews with strategic delivery stakeholders and conducted focus groups with a further 9 Local Authority representatives, speaking to 22 stakeholders in total (one LA participated in two interviews, discussing two schemes). The interviews and focus group explored key elements of the research questions such as the approach to tendering, bid writing and procurement of suppliers, beneficiary engagement, delivery approaches and associated key challenges and successes.

2.10 Interviews and focus groups were conducted virtually (via Microsoft Teams) and lasted one and one and a half hours, respectively. Interview and focus group discussions followed an aide memoire and detailed interview notes were taken. To encourage open and frank feedback, interview findings were only reported to the client team and included in this report on a non-attributable basis. Fieldwork with Local Authorities was used to produce 'good practice vignettes. These provide examples of good practice in local authorities with relevance to particular themes of interest and are provided throughout this report.

Supply chain stakeholder fieldwork

Depth interviews with supply chain stakeholders

2.11 Interviews were conducted with supply chain stakeholders including, for example, retrofit installers who had worked with Local Authorities to deliver schemes. These stakeholders were

identified via interviews with Local Authorities. We found that Local Authorities had worked with a relatively small number of retrofit installers, as national installers operated across numerous areas. Therefore, in order to broaden our coverage and include views from a wider range of individuals, we expanded our interviewee list to include key academics and retrofit practitioners of relevance (but who had not been involved in delivering schemes within the NEY region). In total, we spoke to 13 supply chain stakeholders. Interviews explored key elements relating to the research questions such as supply chain experience of the design and installation stages, their understanding of PAS2035[12] standards and the advice and aftercare offered. As with the strategic delivery interviews, interviews lasted one hour, were conducted over Microsoft Teams, and used an aide memoire.

Analysis

2.12 Across these five sources of information, data was synthesised and triangulated to develop an overall picture in response to each of the evaluation questions. CATI responses were collated, coded, and analysed in Excel using cross tabulations and summary tables. Qualitative findings were written up and organised using an Excel analysis grid. Responses were coded into key themes that aligned with the evaluation questions and then further sub-codes were developed to reflect emerging themes from the data. The strength of evidence available to support each question was assessed and is commented on in the relevant sections of the report.

Methodological considerations

Rationale for methods selected

2.13 The methods selected sought to capture a broad understanding of the nature of the processes involved in the schemes and how different key stakeholders operate individually and with one another. Given this is a process evaluation, emphasis was put on qualitative research to gather nuance and differing perspectives. The rationale for using the methods selected was as follows:

- Desk Review of **scheme documentation and existing literature** was essential to providing context for the evaluation and informing the creation of aide memoires for each stakeholder group. These documents provided a depth of information without the need to burden stakeholders with large numbers of scoping interview requests. They also provided information about schemes even if the staff involved in delivery had subsequently moved on. The scheme documentation contains mostly quantitative outcomes, which could mean that less numerical-led details may not have been captured in this information. Additionally, the existing literature focuses on retrofit on a wide scale, and may lack specific contextual factors relevant to the North East & Yorkshire area;
- The large-scale **CATIs with beneficiaries** allowed us to collect insights into the beneficiary experience that are representative of the population of beneficiaries. While the CATI survey provides a breadth of responses to the key research questions, the **depth interviews with beneficiaries** offer a more detailed exploration of key themes. The answers from the CATIs also offered a key point of triangulation with the depth interviews with beneficiaries, thus supporting us in our conclusions of how generalisable the depth interview findings are;

[12] PAS2035 is a framework developed by the British Standards Institution to create quality standards for the retrofit and energy efficiency sector for housing.

- **Interviews and focus groups** with supply chain and strategic delivery stakeholders allowed for capturing insights into the enablers and barriers to success in the delivery of retrofit schemes and the challenges experienced that may not have been documented otherwise – or at least not in a format that was available for review; and
- The decision was made to present the information captured via **short case study vignettes** as a mechanism for delving into the detail of good practice displayed by local authorities and presenting these to the reader – to illustrate practices that Local Authorities might choose to adopt for rollout of similar schemes.

Methodological limitations

2.14 There are a number of limitations to the evaluation approach selected, which should be kept in mind when interpreting the findings. These are as follows:

- **Difficulty in accessing contact details** for beneficiaries across all schemes meant that beneficiary fieldwork was only conducted with those who received measures from LAD 2 funding. This is because the Hub only held contact details (and permission to share) for LAD2 beneficiaries. This should be noted when reviewing thematic findings from beneficiaries as beneficiary experiences may not be representative of beneficiaries who received measures from other schemes;
- The **reliance on qualitative analysis** means that findings are subjective and limited by what stakeholders were able to recall about project outcomes. In some cases, a stakeholder may have only had a partial picture, or their view may have been influenced by particularly memorable occurrences (for example a recent positive outcome may make earlier difficulties seem less important, or vice versa). There is also likely a degree of bias to be expected since individuals interviewed were personally involved in projects and implicated in their success – this may have hindered their willingness to share details of lessons learned and challenges encountered;
- **Non-involvement from the Department** as part of our strategic stakeholder group. The Department are in the process of conducting their own internal review of retrofit schemes, and as such chose not to participate in the research conducted for this study. As an alternative, we reached out and interviewed relevant academics who were able to offer an overview of retrofit strategy at a national level. However, it is important to note that these academics were not in a position to comment on retrofit activity in the North East and Yorkshire region specifically; and
- **Issues obtaining a diverse set of insights from supply chain stakeholders**. Many of the Local Authorities we interviewed used the same supplier/ installation partner, as they are experienced at delivering these retrofitting schemes across England. As we were reliant on Local Authorities to refer us to supply chain contacts, we were unable to talk to a diverse set of supplier organisations. This limited the diversity of supplier organisations we were able to speak to.

3 The Schemes

Introduction

3.1 This Chapter outlines the context and rationale for the retrofit schemes, driven by the UK Government's commitment to combat climate change and achieve Net Zero by 2050. An overview of the evaluated schemes is provided, along with their foci, funding, and delivery periods. Additionally, this Chapter presents the Theory of Change, key assumptions, risks to successful delivery and the journey maps for stakeholders involved in scheme delivery.

Context and rationale for the schemes

3.2 The rationale for retrofit schemes stems from the UK Government's recognition of the significance of reducing the domestic sector's share of UK carbon emissions. Retrofitting existing buildings is viewed as crucial in achieving Net Zero goals, and thus, the government has devised a range of programmes to facilitate the delivery of retrofit measures via government schemes. Government funding of retrofit schemes is paired with the longer-term ambition to incentivise and encourage the market to deliver retrofit measures without reliance on public funding. A key focus of retrofit schemes is on phasing out high-carbon fossil fuel heating. Low-income and fuel-poor homeowners often lack the financial means to upgrade their heating systems and undertake energy efficiency improvements. In particular, support is directed towards those who are least able to afford the cost of keeping warm, i.e., on- and off-gas grid households who face some of the highest costs, and low-income households. This prioritisation is underpinned by a "Worst first"[13] and "fabric first"[14] approach, aimed at maximising the efficiency of funding allocation.[15]

Aims and objectives

3.3 The overall aims of the retrofit schemes are to:

- **Improve energy efficiency of existing dwellings:** the primary objective is to enhance the energy efficiency of existing buildings through retrofit, resulting in a reduction of their energy consumption and carbon footprint;
- **Alleviate fuel poverty:** Government-funded retrofit programmes are designed to target low-income households to alleviate fuel poverty and improve living conditions, which will create the greatest environmental and social impact; and

[13] The "worst first" approach prioritises addressing the most severe or inefficient aspects of a building's energy performance first. This means focusing on improving elements of the building that contribute the most to energy loss or inefficiency, such as poorly insulated walls or inefficient heating systems.

[14] The "fabric first" approach prioritises improving the building's fabric or structure before considering other energy-saving measures. This involves enhancing the building envelope, insulation, windows, and doors to minimise heat loss and improve thermal performance.

[15] Eyre, N., et al. 2023. Fabric first: is it still the right approach?. Buildings and Cities. 4(1), p.965–972

- **Enhance building performance:** the programmes seek to improve the overall performance and comfort of buildings.

3.4 Table 3-1 provides an overview of the schemes that were in scope of this evaluation, detailing the delivery period and focus of each scheme.

Table 3-1: Overview of Schemes

Name	Time period and funding	Scheme Focus
Local Authority Delivery Phase 1A	Aug 2020 – Mar 2021 £76m	• LAD1 aimed to raise the energy efficiency of low-income and EPC E and below rated homes, including the worst quality off-gas grid homes. • Measures offered included insulation (e.g., solid wall, cavity) and low carbon heat (e.g., solar thermal heating). • Open to homeowners and private renters. • Up to £5,000 was available to homeowners and landlords in England to pay for part of the measures. • Households earning less than £30,000 can get all the cost of work, up to £10,000. • LAD Phase 1B was a continuation of Phase 1A and included EPC D rated homes.
Local Authority Delivery Phase 1B	Oct 2020 to Sep 2021 £126m	
Local Authority Delivery Phase 2	Mar 2021-Jan 2023 £300m	• LAD Phase 2 built upon Phase 1A and 1B, continuing to target low-income households rated EPC D or below. • The scheme was administered by the 5 NZHs.
Sustainable Warmth Competition (LAD Phase 3 & Homes Upgrade Grant 1)	Jan 2022 – Mar 2023 £350m (£200m & £150m)	• The SWC was a single application for LAD Phase 3 and new HUG scheme. • Eligibility criteria included properties in EPC D or below, with a 30% allocation for D rated properties. • Fully funded measures for the householder, however, landlords must still contribute one third of the costs. • A “fabric first” method was encouraged, however measures such as heat pumps were available. • LAD3 was aimed at on-gas properties, with a £10,000 maximum allocation per property. • HUG1 was aimed at off-gas properties and allowed different allocations of funding per household depending on EPC banding and existing heating system.
HUG 2	Mar 2023 – Mar 2025	• Aims to raise the energy efficiency of low-income and low EPC rated homes and phase out high-carbon heating for homes off the mains gas grid. • 60% of the funding was ring-fenced for rural local authorities. • Fully funded measures for the householder, however, landlord must still contribute one third of the costs. Social landlords must contribute at least half of the total cost. • All upgrades must be within the relevant cost caps, which were updated from previous schemes for HUG2. • Eligibility criteria was also amended, with the scrapping of the 30% cap on EPC D rated properties and introduction of properties in LSOAs 1 - 3 being automatically qualified regardless of householder eligibility.

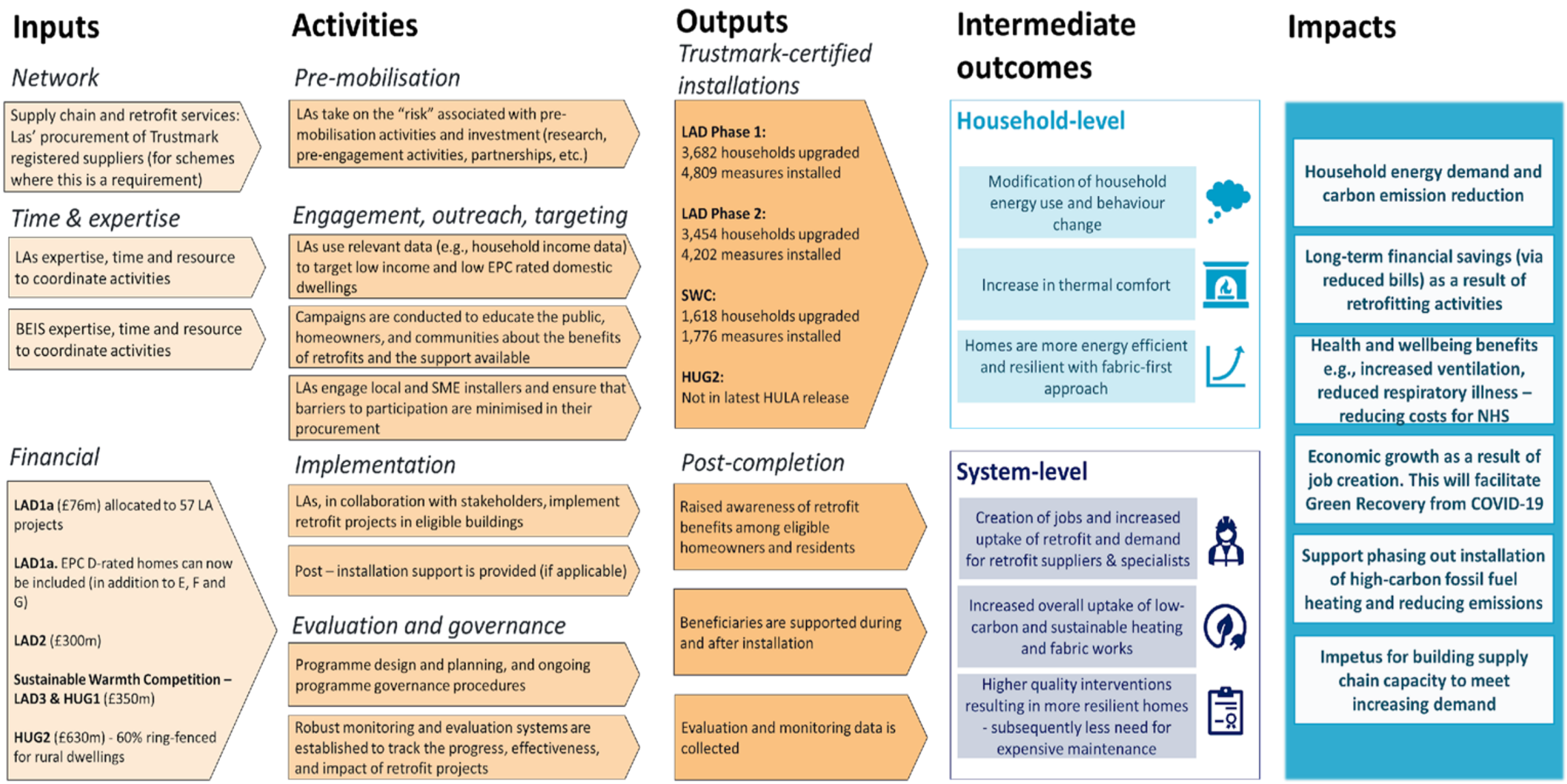
3.5 Figure 3-1 (overleaf) shows the Theory of Change (ToC) for these retrofit schemes in the Hub's region. There was no existing ToC for retrofit activities in the region. As such, Steer-ED developed the ToC as part of this process evaluation. Readers should note, however, that the ToC only reflects schemes that fall within the remit of this evaluation.

3.6 Through development of the ToC, we identified a number of key assumptions. These include:

- Local Authorities have adequate connections to suppliers to meet programme demands, with suppliers being capable of meeting such demands and understanding certification requirements;
- Installations are maintained effectively and arising issues are promptly addressed; and
- Beneficiaries engage with promotional efforts and take part in schemes, receive sufficient information for informed decision-making and undergo behaviour change to achieve energy-saving benefits and avoid rebound effects.

3.7 We also identified several key risks to successful delivery of schemes. These include capacity constraints within the supply chain, challenges in meeting reporting requirements, delays in reimbursement of LAs, fraud risks, inflation, external factors such as weather, COVID-19 concerns affecting participation, and inconsistencies in aftercare procedures.

Figure 3-1 Theory of Chan



Stakeholder journey maps

3.8 The Steer-ED evaluation team developed journey maps to illustrate the different stages experienced by stakeholders during the delivery of retrofit schemes. Journey maps were developed for:

- Beneficiaries (social landlords, private landlords, or homeowners undergoing retrofit works on their property);
- Strategic delivery stakeholders (Local Authorities and central government who seek to encourage and deliver retrofit schemes); and
- Supply chain stakeholders.

3.9 The journey maps are included in Appendices F,G, and H respectively. It is noted, however, that the journey maps presented are not necessarily what always happens in practice, but rather represent best practice guidance and expectations.

4 Tendering, bid writing and procurement of suppliers

Introduction

4.1 The following Chapter focuses on Local Authorities' (LAs') approaches to bid writing for retrofit schemes, their experiences drafting bids (working with delivery partners or independently), and their experience navigating the procurement of suppliers within retrofit schemes.

Resourcing for bids

Working with a delivery partner to prepare bids

4.2 For all schemes, LAs were required to assemble and submit a bid to the Department (BEIS) outlining their request for the amount of funding required to carry out each retrofit scheme. Most LAs in the sample worked with a delivery partner to develop a bid for their respective retrofit programmes. A small number carried out this activity independently, using just their in-house capability and capacity. LAs who worked with a delivery partner to construct bids for retrofit schemes felt this served as a considerable advantage and enhanced the quality of their overall bid, compared to what they could have done if they worked independently on the bid.

4.3 LAs highlighted several benefits of having a delivery partner in place, particularly if this agreement was established before the application phase. They felt that delivery partner involvement at this stage helped to secure the necessary resources for a strong bid and fostered a collaborative and realistic approach between the LA and the delivery partner operating 'on the ground'. Many LAs felt they would have found it very difficult to prepare a credible bid without this due to a lack of capacity. This sentiment was echoed by supply chain interviewees, who felt it was mutually beneficial to be involved at the bid writing stage. Having a delivery partner involved early allowed for setting expectations and planning delivery logistics including determining the 'measure mix[16]' to be implemented based on shared intelligence and sophisticated data from the partner. Whilst recent schemes, most notably HUG2, have been less prescriptive about the specific mix of measures anticipated, the measure mix remains an important factor in bid preparation for ongoing retrofit programmes as it helps to accurately plan delivery.

4.4 The relationships between LAs and their delivery partners were typically established through either formal contracts outlining the partnership's duration and scope, or less formalised

[16] A measure mix is the mix of measures that LAs intend to install (energy efficiency/clean heat), which is submitted as part of an LA's bid.

agreements based on past successful collaborations. These partnerships were often built on a history of working together.

4.5 Even when LAs had a delivery partner to collaborate with at the bidding stage, all LAs expressed that the lack of time to develop bids was a key challenge. Those LAs writing bids independently faced significantly more difficulty due to limited capacity. There were examples of this having a detrimental impact on employee physical and mental health. This undoubtedly had a further negative impact on ability to resource the bid writing stage but may have also impacted other programmes of work within the LA as individuals involved in bid writing often had other responsibilities.

"[Putting together bids alone] meant having to work flat out for about a month, very long hours, each time I ended up very ill afterwards."

4.6 Whilst consultees highlighted that the advantages of collaborating with a delivery partner during the pre-delivery phase were significant, interviewees also noted there were challenges. One particular challenge highlighted was the extent of influence delivery partners had on the overall shape of the bid. In some cases, experienced delivery partners (who were also experienced in the development of bids), exerted undue influence on bid development – sometimes prioritising measures that aligned with their own interests. This issue seemed to be compounded when the LA had limited capacity.

"The delivery of LAD2 became a bit of a solar-dominant scheme, pushed by our delivery partner."

4.7 On balance, however, there were significant advantages of working with a delivery partner, including:

- **Data access and availability**: LAs expressed that delivery partners often had in-house resources that could enhance the quality of bids by utilising data sources that would otherwise not have been available to the LA. This increased the quality, robustness and accuracy of information contained within bids;
- **Wider skills and resource**: Delivery partners contributed additional resources to LAs through internal personnel who could assist with bid writing, research, and analytical support. This alleviated some of the capacity constraints faced by LAs;
- **Local area knowledge and understanding**: National delivery partners with extensive resource had good oversight of the areas in which they operate, adding to the overall accuracy and quality of proposed bids. This understanding of the nuances of the geography added considerable value to bids; and
- **Prior experience in developing bids**: Experienced delivery partners were able to improve bid quality by applying lessons learned from past involvement with public sector proposals. The impact of not working with a delivery partner was particularly pronounced for one LA, whose only unsuccessful bid was one where they did not draw on delivery partner input.

Use of consortia and framework agreements

4.8 Some LAs opted to use consortium agreements (collaborations with other LAs within geographic proximity) in both developing bids and delivering retrofit schemes. The ability to

create a team with other LAs was considered a significant benefit. The increased resource allowed the LA to swiftly commence their project and mobilise activities once their retrofit scheme funding had been confirmed. Consortia also enabled LAs to triangulate information, advice, and expertise between areas, which means that LAs could compensate for knowledge or information gaps using resources from partnering LAs.

4.9 Several LAs were able to use framework agreements to procure their delivery partner. This was considered a benefit as it enabled LAs to tap into a supply chain that is already vetted and well-resourced.

"We could just do a tender and throw it out to market, but that could take 6-9 months. Even with a framework, it took 3 months – but it was less resource-intensive."

4.10 Whilst making use of these pre-established consortia and frameworks was mostly regarded as a positive experience, some LAs noted challenges in having to work within these arrangements. For example,

- One LA raised concerns about an outdated procurement framework that was not fit for purpose – e.g. by being outdated and therefore not being reflective of the current market. Despite this drawback, the LA used this framework as seeking out a delivery partner from scratch would have been considerably more challenging to fit into tight deadlines; and
- Consortium agreements that have pre-existing processes may add additional hurdles for LAs, who would then need to go through compliance and governance measures that would otherwise not be needed when LAs were bidding individually. As such, consortium agreements have the potential to create additional challenges for LAs and divert resource away from other potentially more pressing activity.

LAs without access to a framework agreement to identify suppliers faced challenges despite being able to, in theory, select the 'best' firms through a rigorous procurement process that could be tailored to their needs. These drawbacks included:

- **Short-term nature of schemes unattractive to suppliers**: The one-year delivery period of most schemes was often considered unattractive or less preferable to many suppliers who could opt for other contracts where more time and funding may be guaranteed. This is a particularly significant barrier for areas that already face a shortage of local suppliers;
- **Less experienced LAs:** Some LAs who did not have the experience to be able to conduct effective procurement may find themselves contractually bound to low-quality delivery organisations; and
- **Procurement challenges exacerbate timescales**: The time it takes to fulfil all procurement process requirements can 'eat into' time that is needed for other activities such as mobilisation. When issues arise, it can significantly reduce any remaining time and exasperate timescales that are already considered to be largely insufficient.

Consistency of delivery partners

4.11 Several LAs consistently used the same delivery partners and installers throughout their programmes, primarily procured via pre-existing frameworks. This approach streamlined the process, ensuring a uniform and straightforward approach from start to finish. However, LAs reported differences in experience working with single delivery partners. For example, in LAD2, one LA exclusively partnered with a large delivery provider throughout the programme,

highly commending the delivery partner's role. Conversely, another LA mentioned an overall negative experience working with the same provider, prompting them to explore alternative options for schemes moving forward.

4.12 A small number of LAs mentioned challenges in maintaining consistency of their delivery partners across some schemes. The delivery partners were, on the whole, responsible for managing and overseeing installers, therefore the LAs had limited input on the reasons for consistent or inconsistent use of installers. Some issues encountered include:

- **Quality Assurance**: One major delivery partner, while initially the chosen partner, had not read the contract thoroughly, resulting in installations without proper documentation and approvals; and
- **Lack of transparency of supply chain**: One LA experienced a lack of, and in some cases withholding of, information from their delivery partner regarding important information such as changes in installers. This lapse in communication led the LA to sever ties with the delivery partner for future schemes.

4.13 Overall, the primary contractors used by LAs throughout schemes tended to remain consistent. LAs mentioned that having to change the delivery partner partway through delivery would have severe consequences for the progress of schemes in active delivery, therefore LAs were more likely to sever connections after the completion of contracts rather than during. Despite this, a small number of LAs did choose to stop working with certain delivery partners, primarily due to underperformance and communication issues.

Use of data

4.14 In order to develop bids for retrofit schemes, LAs are required to provide several types of evidence to demonstrate capability to deliver at an appropriate scale for the geographic reach of the LA. To estimate the scale of activity (i.e. the number of potential beneficiaries in the area) and types of measures LAs anticipate implementing, they use data to understand the 'stock' of potential beneficiaries in the area who may be eligible and willing to participate in the schemes.

4.15 Acquiring, managing, and using stock data was generally perceived by LAs as a manageable aspect of the bidding process. Interview evidence suggests that all LAs follow a generally similar process, however, some variations exist in the sophistication of data processing methods and the ability to access specialised data or skills assistance. For instance, LAs that have in-house capability or dedicated data analysis teams, or access to similar expertise through their delivery partners or consortium agreements, were able to navigate this process with greater ease.

4.16 Some LAs expressed confidence in having sufficient data to effectively target the right beneficiaries. Those with in-house data teams or analysts, such as a strategic housing service, could leverage existing databases, including previously conducted stock condition surveys. However, this was not always the case, with one LA reporting a total absence of data in the region and another identifying data gaps in certain areas.

4.17 LAs used numerous forms of data to focus on gaining insight into the spread of potential housing stock that would most benefit from the scheme, as well as identifying individuals who would benefit most. LAs commonly used data such as EPC ratings, property characteristics and council tax or welfare benefits data. EPC data provided key information on the location of eligible properties. As well as EPC data, in some cases, the Energy Savings Trust Analytical Platform was used to gain insight into the housing stock.

4.18 In addition to property-specific data, LAs also used demographic data as all the schemes in scope aim/aimed to target low-income housing. This included, for example, the Index of Multiple Deprivation. This was used to understand the extent of low-income households in LAs' respective areas and the demographic characteristics of individuals who would benefit from the scheme. The need for this data varied by LA. For example, targeting low-income households is less of a challenge in areas where there is a higher proportion of deprived areas (for example, Hartlepool, Sheffield).

4.19 Local geographic knowledge was identified as valuable in lieu of data-led tasks (e.g. understanding housing stock in the area and constructing the measure mix), particularly in circumstances where data might be low-quality or inconsistent. This knowledge aided LAs in targeting beneficiaries and shaping engagement strategies. Some LAs demonstrated the use of more sophisticated techniques, with one utilising a Geographic Information System (GIS) team to identify fuel poverty areas, cold homes, and low-income households. Another employed a strategic housing service with access to private sector data, using internal data analysts to model Energy Performance Certificate (EPC) and income data for eligibility measures.

4.20 LAs often faced the issue of patchy data availability so identifying beneficiaries and their households was not without challenge. This was particularly the case for off-grid households and older properties with long-standing owner-occupiers (who do not have up-to-date property characteristics information such as EPC data). For these instances, having personnel or delivery partners with good local knowledge somewhat compensated for any missing data or information. Interviewees also noted that they would like to see central government accommodate some data challenges by, for example, providing access to data collected by the Department of Work and Pensions (DWP).

4.21 LAs used available data to assemble the measure mix requirements within bids. This has been acknowledged as yielding inaccurate results, with LAs recognising that the true reality of measurements to be installed in homes remains unknown until the delivery team can access and assess the homes directly. As a result, predictions made during the application stage are considered more of an 'educated guess' rather than a detailed strategy. However, this uncertainty has been factored into the programme structure of more recent schemes, for example, HUG2, where the indicative measure mix provided in application forms is not subjected to the same level of scrutiny as in previous schemes. In instances where there was a discrepancy in the quality of data available, it had impacts and the ways LAs were able to navigate their schemes. For example, one area found there was a lack of information regarding electric fuelled homes for their HUG2 scheme, which meant they were unable to estimate the extent of resource that would be needed for electric measures.

"[Due to data gaps] we just ended up spamming everyone on the EPC database with a D or below".

4.22 For pre-HUG 2 schemes (LAD Phase 1, LAD Phase 2 and SWC), the challenges arising from inaccuracies at the application stage (because of low data quality) had significant implications. Disparities between predicted and actual measure mixes required for the cohort of properties in view, resulted in time-consuming change requests and approvals. These inaccuracies due to poor data at bidding stage underscore the importance of improving data quality so that LAs can better plan the delivery phase.

Communications between strategic delivery stakeholders

4.23 The Department is responsible for the policy development, design, and programme monitoring of retrofit schemes. Along with the other four Net Zero Hubs, the North East and Yorkshire Hub was the administrative body and delivery vehicle for LAD2 and reported to the Department. The Department have resourced the management of other schemes. The management and administration of schemes include responsibilities such as:

- LA liaison and support;
- LA application review;
- Monitoring and governance with Las; and
- Allocation of funding and managing the release of funds to LAs.

4.24 The experience of communication and engagement between LAs and the Department at the application stage varied between LAs. One participant noted a positive experience, expressing no recollection of communication issues. They believed that the Department provided sufficient guidance to understand funding and delivery expectations. However, several other participants shared mixed experiences. Some found discrepancies in the level of communication between schemes. Some minor challenges included errors in the application form which took considerable time to rectify, and turnover in staff within the Department meant communications were fragmented and actions were sometimes not followed through.

4.25 Other interviewees expressed stronger concerns about communication with the Department during the application process:

- Some LAs found the application requirements to be overly prescriptive, requiring change requests later during the delivery phase, even for minor adjustments. However, the support provided by the Department in the lead-up to bid submission dates such as workshops and meetings were considered to be helpful;
- The amount of communication received from the Department to LAs was variable. Some LALA stakeholders reported receiving too much information, whilst others found they received very little information or updates;
- Communication tended to involve seminars and videos rather than one-to-one communications. The reaction to this varied between Las, with some finding it adequate whilst others would have preferred more direct communication;
- Delays in response times, lack of answers to critical time-sensitive questions, and a perceived lack of knowledge within the Department were highlighted as communication challenges;
- Concerns were also raised about paperwork becoming more onerous, with the Department only recently considering toolkits for assistance; and
- Lastly, monthly meetings with the Department were reported to be challenging due to staff turnover, leading to issues associated with inconsistent support and disjointed communication.

4.26 For LAs involved in LAD2, communication primarily occurred through the Hub with very little direct engagement with the Department. LAs commended their experience with different account managers from the Hub. There were some issues mentioned – for example, it can take some time when the Hub needed to get clarification from the Department, but interviewees generally understood that this takes time. However, on the whole, the relationships between LAs and the Hub was regarded as positive. LAs particularly appreciated the Hub's:

- **Proactive approach in cultivating peer support** through joint groups;

- **Constructive challenge** of LAs; and
- **Excellent support and proactive assistance** in navigating challenges.

4.27 Participants also identified specific individuals within the Hub, such as account managers, who played a critical role in fostering a collaborative, communicative and constructive relationship.

"Where [the Hub] support stood out was cultivating peer support and having LAs work alongside each other knowing others are struggling as well. Together, the LAs felt like we had a powerful voice."

Changes over time

4.28 Changes to the design of schemes implemented by the Department were perceived as both positive and, in some instances, challenging. On a positive note, the application process for HUG2 has undergone simplification when compared to the procedures observed in the Local Authority Delivery 1 (LAD1). Comparatively, LAs noted fewer distinctions between the design of LAD1 and LAD2, implying that there may have been less focus on implementing lessons learned between the two schemes, and that LAD2 was more of a continuation of LAD1.

4.29 A further positive change involved an adjustment in how prescriptive the measure mix requirements were for certain schemes. This modification reflects an acknowledgment from the Department that the initial measure mix input in applications is prone to inaccuracy and, is understood to function as more of an estimate. The flexibility to amend these estimates later in the process is welcomed by LAs as a positive change to what was previously the source of many challenges.

"The measure mix used to be the root of a lot of trouble – but this has been changed in requirements for HUG."

4.30 Conversely, some interviewees have reported that certain aspects of the application process have become less efficient. Notably, the involvement of 'middlemen', i.e., organisations appointed by the Department to perform roles and responsibilities previously attributed to the Department. This shift introduced complexities in coordination and consultees felt it may impact the overall efficiency of the pre-application process. One LA noted that these 'middlemen' often did not have the answers to, for instance, policy questions. As such they had to defer to the Department. This defeated the purpose of introducing outsourced organisations to fill a critical communications and information delivery role.

Key Learnings

4.31 Based on the findings relating to tendering, bid-writing and procurement, the following areas for improvement have been identified:

- **Resourcing for bids:** Streamline bid writing processes and extend timeframes for bid development to alleviate time constraints and prevent burnout;
- **Collaboration with delivery partners**: Mitigate undue influence from large delivery partners on bid development, ensuring bids prioritise LA needs over partners' interests. This could be achieved by supporting the LA teams during this stage and improve resourcing for bids (as above)

- **Use of consortia and framework agreements**: Address challenges in outdated procurement frameworks, address issues of reduced supplier options, and prioritise fair selection processes within consortium agreements;
- **Consistency of delivery partners:** Strengthen communication channels between LAs and delivery partners to address lapses in information sharing and maintain accountability;
- **Data utilisation:** Enhance data quality and accessibility to improve accuracy in predicting measure mixes to help LAs better plan for delivery and to better target beneficiaries;
  Data gaps: Explore ways to address data gaps particularly for off-grid households and older properties, through collaboration with central government agencies to leverage comprehensive data sources;
- **Communication with strategic delivery stakeholders:** Improve communication channels between LAs and the Department, by reducing delays in information dissemination and response times, ideally removing 'middlemen' from more recent schemes, to support timely delivery; and
- **Scheme developments:** Embed evaluation and learnings from previous schemes into future delivery.

5 Beneficiary Engagement

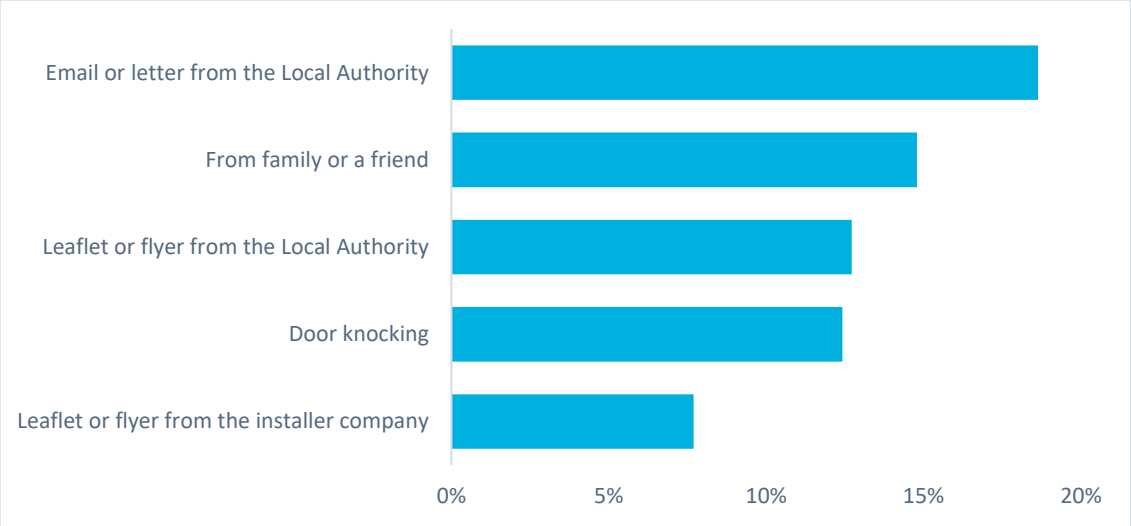
Introduction

5.1 The following Chapter focuses on LAs' approach to beneficiary engagement for the retrofit schemes, and how LAs utilised different methods and information sources to target and secure residents for installations.

Promotion of schemes

5.2 LAs used numerous techniques to promote the scheme(s). **Error! Reference source not found.** below shows the top five most common methods of communication from which beneficiaries first reported hearing about LAD2, from the beneficiary survey.

Figure 5-1: How did beneficiaries hear about the LAD2 retrofit scheme? (n=338)



Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

5.3 Key methods, in the order of how commonly they were used by LAs, are discussed in more detail below:

- **Traditional media such as mail-outs and letters*:*** Most LAs made use of mailouts and/or letters – 39% of beneficiaries from our survey reported they first heard of LAD2 via a letter, email, leaflet, or flyer. These were reported by LAs to be a relatively easy method to deploy. It was also reported, however, that they had limited success as they could often be dismissed by residents as spam. To be most effective, delivery stakeholders stated that these methods need to be coupled with a more interactive form of communication, such as, deploying canvassers to properties promptly after the distribution of mailouts or letters;
- **Social media:** Most LAs used social media marketing, which was considered the most effective method and good value for money. This was especially the case where targeted

adverts were used. For example, marketing via Facebook allowed LAs to focus adverts at specific relevant postcodes. Whilst not explicitly reported by beneficiaries one consideration is that this approach to marketing requires beneficiaries to have social media access. As such, social media marketing may not reach those who are low-income without access to WIFI, computers, and other necessary amenities. Some LAs with lower social media presence (for example without channels that residents can easily refer to) were not able to successfully use this method. There was acknowledgement from some LAs that they are working on developing their online brand, presence, and voice with a view to developing online communities that can be engaged with in the future. Our beneficiary survey found that online social media adverts by installers and LAs accounted for 9% of first communication received by survey participants;

- **Collaborating with local press**: Some instances of working with local press were reported, yielding mixed results. According to LAs who used this method of communication, engaging the press can be challenging. Difficulties include ensuring that the timing of press releases align with scheme timelines; and preventing oversubscription by managing the scope of communications. One LA stated they avoid collaborating with the local press, as it can lead to residents outside of their targeted areas requesting work from the scheme. Some LAs also published in council publications, but this only reaches a limited audience;

"We didn't want someone from the other end of the district calling up for a measure they can't get."

- **Door knocking**: The beneficiary survey found that 12% of respondents first heard about the scheme through door knocking. When implemented by a well-spoken and well-versed LA canvasser, this was reported by stakeholders to be an effective way of establishing a relationship with the local community. Door knocking and word-of-mouth were considered to be the most important out of all the engagement methods, not just for the schemes and beneficiary uptake but for the overall profile of the councils. Many of the LAs who were able to use this method did so (COVID-19 was cited by numerous LAs as a restricting factor in door-knocking). The ability to answer questions in real time was reported to be invaluable for instilling confidence in potential beneficiaries and ensuring any misunderstandings are dealt with in a timely manner. However, this is a resource-intensive exercise especially so for LAs that span a wide geographical area;
- **In-person events:** Hosting dedicated events was reported as being relatively inefficient and was also not feasible during the COVID-19 Pandemic. Using opportunities to host a stall in other more widely attended events, however, was found to be useful in gaining the attention of attendees;
- **Open days:** LAs found open days to be effective, but more so for certain property types that are clustered together (for example social housing), meaning that open days could be located near a large number of relevant dwellings; and
- **Working with suppliers and installers:** While few LAs reported promoting the scheme to beneficiaries through suppliers and installers, many worked with local suppliers and installers to understand and gauge demand for different energy efficiency technologies in their area. Some LAs reported negative experiences of working with suppliers and installers to promote schemes. Stakeholders reported that beneficiary engagement and scheme promotion generally work best when the council/LA serves as the front-facing entity. This instills confidence in the legitimacy of the scheme and fosters strong client relationships. After the initial engagement, the LA can then signpost to the delivery partner to provide further information for enquirers.

5.4 In addition to the promotional techniques discussed above, LAs consistently emphasised the power of **word-of-mouth** and visibility in the community. The beneficiary survey found that 15% of LAD2 beneficiaries first heard about the scheme by word-of-mouth via family and friends. LA stakeholders reported that this is one of the most powerful ways to engage residents and reach low-income communities that may be harder to reach.

Beneficiary uptake

5.5 KPIs for the schemes were set by the Department and were monitored by LAs via monthly reports. The KPIs set were:

- The number of applications and measures installed;
- The cost of installations;
- EPC improvements associated with measures; and
- Any risks or issues arising, and their mitigations.

5.6 LAs reported that it was important to strike the balance between aiming for too few or too many subscribed properties. Targeting too many households through promotions poses a risk of over-subscription. For example, one LA reported that their promotion involved writing to 10,000 properties with E, F, or G EPC ratings and they were then inundated with requests for measures. This meant that their LAD scheme received far more applications than they could accommodate until an extension was granted. Whilst over-subscription allows LAs to meet beneficiary KPIs more quickly, LAs reported that there are potential negative consequences. These included disappointing residents who are unable to receive measures, and time spent by the LA managing householders' expectations.

5.7 Some LAs explained that they approached beneficiary engagement later in the process and focused initially on other activities such as procurement. In comparison to those who engaged beneficiaries early, however, this may have resulted in under-subscription in their scheme. Delaying engagement may mean that the time available to generate interested and engaged beneficiaries is not sufficient for the scheme to meet KPIs.

"Procurement is the thing that slows everything down, I don't think there's a recognition for how long it takes, it can take up to 6 months."

5.8 LAs flagged that the absence of a clear strategy to target beneficiaries during the engagement process could lead to significant financial consequences. Property surveys, which are essential for this process, cost LAs around £300-£400 per home. It is, therefore, crucial for LAs to minimise unnecessary expenses that could be accrued by surveying homes that are not suitable for schemes. Equally, the government should also support LAs in surveying these homes as a means of collecting data on the UK building stock and developing the Building Passport Logbooks. Whilst the Department does provide some funding to cover surveying costs, the amount provided was not always enough to offset the expenses incurred. Consequently, LAs stressed the need to be cautious and strategic in how they engage with potential beneficiaries in their respective areas to avoid wasted funds.

5.9 A commonly reported challenge experienced by many LAs was their ability to meet measure mix KPIs. As previously discussed, LAs found that estimating a measure mix of their total installations from the scheme was difficult and led to many LAs requesting measure mix alterations once the contract had been awarded. One LA reported that they could have had

more useful conversations with residents and would have been able to get more measures installed if they had not had to adhere to a pre-decided measure mix target. Furthermore, two LAs reported that they had to push for residents to receive certain measures that were not necessarily the best option for them in order for the LA to meet its pre-determined measure mix target. One of the LAs then continued to say that this caused beneficiaries to become frustrated as they were being told they were receiving less effective measures in order for the LA to meet its targets.

Beneficiary experience of the engagement stage

5.10 Interview and survey responses were based on what beneficiaries could recall. However, we note that the initial engagement stage for many consultees was more than a year ago and, in some cases, almost two. This means that recollection of information beneficiaries received during initial visits or the installation was often limited.

Positive experiences of engagement

5.11 The most notable positive aspect cited by beneficiaries was receiving measures (worth up to £10,000) for free, which would help to reduce their monthly energy bills. The offer of free measures commonly arrived during a period when beneficiaries needed them, for example, they were facing significantly higher bills but were not able to enhance the features within their homes to reduce them, or their heating or boiler was not working properly or had completely broken. Many households reported that they had previously looked into measures (for example double glazing, solar panels, wall insulation) but after received quotes, installing these measures without funding support was unfeasible. Thus, being offered measures that they could not afford otherwise was incredibly appealing.

"The energy bills, carbon footprint, and net zero is great, but I want to just be able to pay my bills - they are crippling me. So, if someone says I can help you reduce that, that's going to be my go-to. Net Zero to us as individuals is not something you'd have a conversation with your friends or family but obviously you talk about your energy bills" – insulation focus group

"I got a leaflet through the door from the local council and just rang the number. I did need a new boiler and it said it was all free. I didn't think I would qualify but they said I did" – 66+, boiler, loft insulation and air source heat pump, Redcar & Cleveland

"A guy knocked on the door, said you can get house insulation for nothing, so I said go ahead and do it" – 66+, wall and loft insulation, Bradford

"For a long time, I've wanted solar panels, then at the time where all the energy crisis happened, I thought, I wish I could afford them. Basically, because I'm disabled, I'm on benefits there's no way I could afford it. So, when they offered it, I just jumped at the chance. Two in one - I save money and help save the planet. I'm grateful to the Council for allowing it

to happen for people who can't afford it because otherwise I definitely wouldn't have done it" – 36-50, solar, Hambleton

5.12 Receiving an initial letter outlining and explaining the scheme allowed residents to read about the scheme in their own time, to think about the offer and check that it was legitimate before taking things further. A few households had received an initial letter and then been invited to a meeting in their local community hall to listen to presentations from the LA, their social housing association and retrofit installers. It enabled residents to consider the 'offer', ask questions and helped reinforce that the scheme was legitimate. However, this marketing approach was the exception rather than the norm.

5.13 Seeing the work done elsewhere had a huge positive impact during the engagement stage as it provided reassurance about the quality of the workmanship and the legitimacy of the scheme. While this was uncommon and not many people experienced this, beneficiaries with neighbours or family who had similar measures installed were more likely to apply themselves.

5.14 The staff who went to houses to explain what is on offer can help provide reassurance about the scheme. This, however, depends on how knowledgeable and personable they are. The initial engagement with the surveyors was also described positively overall, with beneficiaries using words such as 'friendly' and explaining that they communicated the information well before the installation occurred.

"The two guys that came round were great. Really helped me understand what was going on, and what was required, helped to see whether it was something that was available to me or not and explained the process" – 18-35, hybrid heat pump & boiler, Sunderland

Beneficiary concerns

5.15 It is unclear from the quantitative survey, or the qualitative depth interviews, how many residents chose not to apply because of concerns that the scheme might be a scam. What is clear from the qualitative interviews is that many of those who decided to go ahead (and did not know family, friends or neighbours who had been through the same programme) were themselves initially unsure if the scheme was legitimate. Moreover, 25% of beneficiaries who went through with the LAD2 scheme reported in the survey that they initially did not trust the scheme and did not believe it was legitimate. This percentage is likely to have been higher among beneficiaries who did not go ahead with measures. This aligns with qualitative findings that even some of those who engaged in the scheme and applied were still not fully persuaded that it was a genuine scheme, and wondered if there was a 'catch'.

5.16 On the whole, beneficiaries could not recall the information provided having any clear rationale about why their property had been selected for the free measures, and this added to doubts about the legitimacy of the scheme. Stakeholders noted that making use of the LA logo, reinforcing that it is a government-funded scheme, and explaining why the measures were being offered were all beneficial for adding legitimacy to communications.

"When the letter came in, I thought it was just a joke, I thought it was just a scam." - 36-50, low carbon heat pump, Stockton-on-Tees

5.17 Some residents experienced lengthy waiting times from the period they got accepted onto the scheme to when they were provided with a timeline or when the measures started to be installed. As well as being frustrating, this also reinforced concerns that the scheme might be a scam, as some residents had no idea if any work was going ahead. Beneficiaries who had to wait a long time described emotions such as feeling 'forgotten about', and in some cases, feeling 'let down'. One resident mentioned being without heat throughout the entire winter period as she waited for updates regarding the installation.

"He seemed to imply that it would all go ahead quite quickly. I then seemed to hit brick walls. I wasn't overly impressed with the company really, although I didn't know much about them" - 51-65, hybrid air-source heat pump, Ryedale

Understanding of scheme information and rationale

5.18 The focus in all forms of communication, or at least from what residents could recall, appears to have centred around the financial benefits of the scheme – getting something for free, the measure reducing energy costs, and most frequently, that it would increase the value and saleability of their property. Many could not believe they were being offered so much for no cost. The communication tends to emphasise what they were getting rather than any clear rationale of why they were being offered this. Simultaneously, there was little mention of the 'green' benefits, making a contribution to low carbon or reaching net zero. A few who had solar panels installed stated that they were pleased to do their 'bit' for the environment, but this tended to only be mentioned when prompted rather than as a primary reason. Of the beneficiary survey respondents, 22% reported that lowering carbon emissions was one of their top three reasons for pursuing the measure, which was the fifth most common reason given. Other measures were discussed by beneficiaries as a way to save them money. In other words, the schemes are promoted on the basis of financial benefits, which were the things beneficiaries mentioned first and foremost.

5.19 Many beneficiaries were unable to recall being provided with any information or a clear rationale as to why their property specifically had been selected for the free measures to be installed. This led many to question why they and not others in the street or neighbourhood had been targeted. Many stated that they did not initially see how they could qualify as they were not in receipt of benefits, did not live in social housing, and were not registered disabled. Thus, it was a surprise to them to find out that they were indeed eligible. This was particularly the case when communication with residents was in the form of letters. Again, what is not known is how many eligible residents fail to apply because the communications do not make it clear why the scheme is being offered and what types of properties are likely to qualify.

"I think it'd be nice to know if it was a lottery, or was it because it's something that I did right or wrong. You know, for them to choose me it'd

be nice to know what it is. I mean, like I said it just might be a lottery" - 36-50, low carbon heat pump, Stockton-on-Tees

5.20 It was also mentioned by some residents that the initial method of communication failed to state that the process was free. As such, they did not initially engage with the scheme. After receiving initial communication (verbal or written), some beneficiaries stated they were left confused as they had been provided no direct way of communicating with anyone involved with organising or delivering the scheme. Some just wanted confirmation of what was going on, such as a timeline for when contractors would be coming (which they had no way of finding out).

"There was no central organisation who I could contact in case of X, Y, Z. There was no timeline given. There was nothing. It was just random people calling me up. I had to trust that they weren't some weirdo. I needed to know in advance who was going to be contacting me and who to call in case of some kind of problem" - 51-65, solar, Leeds

5.21 The beneficiary survey found that after initial contact and after receiving more information about the scheme, 77% of beneficiaries felt they understood the scheme and how it would work (reporting 'fully' or 'mostly' understanding), while 10% stated they did not understand the scheme. While this is positive, it highlights that there is still a need for clearer communication for a non-trivial portion of beneficiaries. The levels of beneficiary understanding varied very slightly across household composition types. Family households had the highest level of understanding, with 82% mostly or fully understanding how the scheme would work, whereas one-person households had the lowest, with 71% mostly or fully understanding how the scheme would work. This slight difference may suggest that those in one-person households are less able to discuss the scheme, and therefore this demographic may require more support.

Eligibility and suitability of measures

5.22 During the engagement stage, some beneficiaries were informed they would only be eligible to have measures installed if they paid for alterations to their homes prior to being accepted. While this was understandable, some stated that there could have been a contract in place that provided them with guarantee that they would get the installed measures if the changes were made. Doing this with no signed guarantee was worrying and potentially a waste of money if it did not go ahead.

"They found that the little utility room at the back which used to be a kitchen had been built later and had got cavity walls that could be filled. So, I paid £800 for the cavity walls to be done, so that I could then get the £10,000 for the grant … I was a bit uncertain" - 51-65, hybrid air-source heat pump, Ryedale

5.23 Few beneficiaries had any choice over which measure would be installed in their property. In the beneficiary survey, 54% of recipients reported they had no choice at all in what measures were installed. There was also little evidence of residents receiving information about the rationale for installing the measure or measures suggested, or why other ones were less suitable. While appreciative of having the retrofit measures installed, many felt it would be useful to know why they were getting certain measures rather than other options installed.

"When I think about it now, we were pushed into it [Air Source Heat Pump] and fobbed off with that. I think they should give a choice. I feel we would have been better off with solar panels but they weren't given as an option" – 66+, boiler, loft insulation and air source heat pump, Redcar & Cleveland

5.24 Even when they received the measures they wanted, some beneficiaries wanted more clarity about what they were getting. Some beneficiaries, who had solar panels installed, expressed surprise and disappointment at getting fewer panels than they expected or not having enough panels to fill their roof. For those who were told that they were getting £10,000 worth of measures installed, there was often confusion or disappointment when the value of their measures did not reach this total, especially if they received considerably 'cheaper' measures such as loft insulation.

Key Learnings

5.25 Based on the findings relating to beneficiary engagement, the following areas for improvement have been identified:

- **Centralised promotion strategy:** LAs called for comprehensive promotion efforts from central government, aimed at increasing trust and reducing skepticism. Simultaneously, targeted promotional campaigns tailored to the specific requirements of individual schemes should be implemented, ensuring effectiveness without attracting ineligible households or enquirers.
- **Centralised data provision support:** LAs require support from central government to establish streamlined processes for data gathering, providing a centralised repository of information accessible to all local authorities. This would ensure that all LAs have access to information they need to effectively engage with beneficiaries and promote schemes to eligible households.
- **Focus on building trust:** Beneficiary engagement strategies should provide explanations and reassurances about the scheme, and where possible should include some in-person elements. This would help to address beneficiary concerns regarding legitimacy. This should ideally incorporate details about the retrofitting scheme, eligibility criteria, and contact information and display LA branding on all communications. Strengthening the visual association with the local authority reinforces the scheme's legitimacy and fosters confidence among beneficiaries. Communications should also outline the LAs' objectives and scheme rationale, to facilitate trust.
- **Structured follow-up communication:** In order to support beneficiaries, LAs could implement a structured follow-up communication process to provide additional information and address beneficiary concerns. LAs could utilise follow-up letters to introduce installation partners, clarify ongoing costs, and offer reassurance through clear

explanations and weblinks to FAQs. There should be multiple routes for contact and follow up to cover different audience needs.

- **Personalised explanation of measure selection:** Personalise communication with beneficiaries by explaining why specific measures have been selected for them. This approach would increase beneficiary engagement and foster understanding of available options.
- **Utilisation of success stories:** Based on reports of the effectiveness of word of mouth, LAs could leverage success stories to promote the scheme's legitimacy and benefits. Incorporate local success stories through online platforms to showcase tangible outcomes and address beneficiary concerns effectively.
- **Implementation of online review system:** Beneficiaries were very supportive of the introduction of an online review system akin to *Trust Pilot* or *Trip Advisor* to gather beneficiary feedback and enhance scheme legitimacy. This would require filtering mechanisms to facilitate meaningful feedback and address any negative experiences promptly.
- **Clarification of environmental impact:** Communications could better emphasise scheme's environmental impact to foster greater understanding and engagement. Emphasise the role of scheme participants in contributing to national carbon reduction targets, aligning individual actions with broader societal objectives. This could help to empower beneficiaries by ensuring they understand their role in contributing to carbon reduction efforts and achieving net-zero emissions.

6 Delivery and Installation

Introduction

6.1 This Chapter covers experiences of the delivery and installation of measures, from the strategic delivery, beneficiary, and supply chain perspectives.

Fraud mitigation tactics

6.2 For mitigation of fraud by residents and occupiers, income verification emerged as a pivotal tool. For most LAs, this involved meticulous checks, encompassing the submission of documentation such as bank statements and tax returns in the case of self-employed individuals. In some cases, fraud checks were completed by the LA, and in others, it was completed by the turnkey provider. LAs noted that applicants would have difficulty in falsifying such documents and that this tactic proved generally effective as a first line of defence, ensuring progression in retrofit programmes only for eligible individuals. Challenges arose in cases of self-employed individuals, where documentation was occasionally outdated, posing a risk of undervaluing income. Additionally, the verification of Energy Performance Certificates (EPCs) played a crucial role in ensuring properties were eligible for retrofit measures.

6.3 The Department reporting requirements placed significant emphasis on tactics to prevent beneficiary fraud, however, LA stakeholders generally felt that the extensiveness of these measures was not proportionate to the level of risk: most felt supplier fraud was a more pressing issue. Several LAs conducted their own checks or audits to ensure supplier compliance with PAS2035 standards. As exemplified by the vignette below, this proved to be a crucial step as there were several instances of non-compliant measures that were found.

Importance of independent compliance checks (anonymous LA, LAD2)

One LA found they frequently needed to challenge their contractor throughout the scheme. Before approving proposed installations, the LA put in place processes to compare EPC to the PAS035 assessment conducted by the installer. This process, while not a requirement, was crucial in detecting a number of discrepancies between the EPC and the PAS2035 assessments. They found that one of the contractors would override the existing EPC to make a property eligible for measures.

"They saw it as a bit of a cash cow, it seemed like every single property was recommended to have a full ventilation system with a mechanical module in the loft which came in for another £500 per unit plus the £500 for the retrofit assessment meant and [the supplier] knew they could get £1000 as the scheme was trying to be delivered quickly."

The same LA also found, via site visits, that PAS2035 sign-off was being granted to installations by suppliers without going through the requisite checks. These issues are unlikely to have been detected without the LA undertaking its own additional assurance.

6.4 Several LAs decided to contract an independent retrofit coordinator for later schemes. Experience with previous schemes revealed that suppliers were more likely to recommend preferred measures in the initial household assessment and that when it came to signing-off installations, suppliers were essentially 'marking their own homework'. By employing an independent retrofit coordinator, or conducting that role themselves, LAs felt more confident that measures complied with PAS2035 standards.

6.5 When LAs did audits, these typically involved making post-installation calls to households and visits to a sample of properties (approximately 5-10%) to verify that the measures had been implemented as claimed. Through these audits, consultees reported that evidence of non-compliant measures being signed and approved was not uncommon, and was reported by several focus group members and several depth interviews.

6.6 Whilst an extreme example, and an anomaly across the LAs consultations, one consultee reported that there was an instance where the number of non-compliant measures was found to be so high (and these non-compliant measures had been consistently approved by the supplier's assessment team) that the LA escalated the issue to Trustmark who subsequently revoked the supplier's licence.

6.7 In response to the concerns of compliance, a small number of LAs had invested in retrofit coordinator training and certification for member(s) of the LA delivery team in later schemes. They reported that this training was instrumental in supporting them to be better placed to hold suppliers accountable and challenge them where needed. Others expressed appetite for wanting to upskill the team by taking part in retrofit training and saw the value in conducting LA-led post-installation checks but did not have the resource to do this.

Communications with the Department and the Hub

Reporting

6.8 Monthly reporting was the primary method of communicating progress between the Department and LAs. LAs submitted reports, which were often completed by contractors and then reviewed by the LA before submission to the Hub or the Department. These reports were central to the governance process, containing information on KPIs, progress, and highlighting potential risks or anticipated issues. LAs also held regular meetings with various stakeholders to open channels of communication, discuss progress, and address issues. These meetings informed progress tracking, KPIs, and adjustments to project expectations. In particular:

- Some interviewees noted an increased complexity of reporting as retrofit schemes expanded. For example, between LAD1 and LAD2, respondents reported that the Department requested more complex information. This was often challenging to fulfil due to resource limitations.
- Some LAs adopted internal reporting processes to track project performance and inform senior council officers. When this was the case, LAs found this to be more helpful as these processes were adapted to the needs of the LA. Conversely, the Department reporting requirements were felt to be overly onerous and not a useful tool for LAs to monitor progress.

Communication with the Department

6.9 LA experiences of communication with the Department throughout the other schemes were more mixed. Instances were noted where LAs faced difficulties obtaining answers to complex questions or timely responses to urgent matters. The Department account managers were

perceived as responsive and efficient by some interviewees, while others noted less experienced account managers deferring to other departments in the Department which created a sense of being 'passed around'.

6.10 LAD2 funding was administered to LAs via the Hub. Communication and engagement between LAs and the Hub during LAD Phase 2 were described as 'excellent' in most cases. LAs indicated that communication was efficient and effective, characterised by timely feedback and experienced key contacts at the Hub. Communication frequency varied across different phases and LAs, with some recalling monthly reporting to the Hub whilst others recalled working with the Hub on a more ad-hoc basis.

Governance between LAs and The Hub/the Department

6.11 Across all LAs, respondents consistently mention submitting detailed monthly reports to the accountable body (either the Hub or the Department) once funding outcomes are announced. These reports contained predominantly numerical information about installation progress, costs, and other relevant data to demonstrate the progress of ongoing retrofit schemes. Numerical indicators, while serving as key metrics for the Department/Hub, cannot provide a comprehensive understanding of what is happening on the ground, including identifying gaps and deficiencies that require swift action to improve the implementation and outcomes of the scheme. Additionally, all LAs held regular meetings with the Hub/the Department to facilitate discussions on progress and address barriers.

6.12 The effectiveness of monthly reporting varied among respondents and depended on several factors. For instance, some found that the clarity for what was expected with reporting requirements could be vague, for example for the SHDF schemes in particular, and others found difficulties in maintaining timeliness and accuracy of data submission. Several other respondents indicated that they found monthly reporting to be a valuable tool for tracking progress, identifying challenges, and ensuring compliance with the requirements of the retrofit schemes. The uniformity and regularity of reporting allowed key stakeholders to stay updated on the status of installations against targets and KPIs, and other key metrics, which allowed LAs to stay on top of decision-making and resource allocation.

6.13 Some respondents highlighted challenges and limitations associated with monthly reporting requirements. For instance, the more recent implementation of a portal to submit reporting data was initially tricky for some LAs as even minor issues would result in non-submission, or the report being sent back. However, once these initial issues were rectified, LAs developed a good understanding of this process, which was considered more streamlined than having to manually submit reports to their designated Hub/Department account managers. In some instances where LAs were not able to delegate reporting responsibility to delivery partners, the reporting processes were perceived as cumbersome or time-consuming.

6.14 Respondents also commonly questioned the specific metrics they were being asked to monitor and record for reporting requirements. For example, one LA questioned the value of collecting EPC data of properties, stating "When you look at the value of an EPC, it's actually very loose and it's not a very good measure of anything". Further to this, they state that the result of an EPC test can be subject to the person who carried it out, how long they spent in the residence, and how committed they were to accuracy. Based on this, some aspects being measured in reporting data may reflect a somewhat inaccurate representation.

6.15 Similar to the monthly reporting requirements, regular meetings held between LAs and The Hub/the Department were mostly regarded as a helpful part of the process. Across the board,

the LAs agreed that regular meetings served as crucial forums for stakeholders and fostered a culture of open communication and ability to problem-solve on a real-time basis. Meetings provided opportunities for LAs to discuss issues and find resolutions collectively.

6.16 Beyond their functional aspects, regular meetings between LAs and the Department or the Hub facilitated relationship building and engagement between all stakeholders. These differed between LAs – some reported holding weekly meetings whereas others met on a less regular basis. Some LAs noted that having face-to-face meetings resulted in higher quality support where needed, in comparison to exchanges made over e-mail or other less direct routes. This forum allowed for more effective and efficient conversations to take place with accountability agreements from specific personnel made within the call.

6.17 Overall, while monthly reporting served as an essential mechanism for monitoring progress and fulfilling reporting obligations, its effectiveness could be further enhanced through continuous improvement efforts aimed at simplifying procedures and ensuring that reported information remains relevant and actionable for LAs.

Enablers and barriers to delivery

6.18 A successful delivery approach was marked by several positive factors:

- **Experienced Personnel:** Having experienced personnel from either the Hub or the Department played an important role. This allowed for the sharing of valuable insights, feedback, and further knowledge, contributing to the overall effectiveness of the delivery process;
- **Regular Communication:** Regular communications between the LA and supplier proved to be important for smooth delivery. It allowed for early identification of issues and a more collaborative approach utilising both the LA's local knowledge and the supplier's expertise; and
- **Internal and External Reporting:** Both internal and external reporting mechanisms proved largely effective. This approach ensured that senior personnel were consistently informed about project performance, providing an efficient model for maintaining oversight of project progress.

6.19 However, LAs also noted certain challenges:

- **Lack of Preparation Time:** The absence of lead-in times for pre-delivery activities such as measure planning and procurement emerged as a significant challenge. This meant in several cases that LAs were working out procurement issues months into the delivery period which squeezed timelines for delivering measures;
- **Resource Limitations:** Resource limitations were cited as a noteworthy challenge in specific cases. Particularly, the ability to provide adequate levels of aftercare faced constraints; and
- **Clarity Transitioning to PAS2035 Requirements:** During the transition to PAS2035 requirements, suppliers and LAs encountered difficulties due to a lack of clarity regarding the specific requirements and the lengthy paperwork needed to satisfy PAS2035 standards.

6.20 Several enablers contributed to the successful delivery of measures that were PAS2035/TrustMark compliant:

- **Installer-LA Relationship:** Building a positive relationship with installers emerged as a crucial enabler. This relationship allowed for a transparent exchange of information between the LA and contractors, enhancing the delivery process. Effective collaboration

and communication with contractors ensured issues could be identified and addressed in real time;
- **Access to PAS2035 Experts:** Some teams had access to PAS2035 experts, providing valuable advice to ensure compliance with standards. This access to local expertise significantly contributed to the accuracy and quality of compliance processes; and
- **Relationship with Receptive Households:** A positive relationship with receptive households played a key role. Households, motivated by the increasing cost of living, were generally found to be receptive to the offered measures. This motivation to save money on energy bills facilitated compliance from the beneficiaries' perspective.

6.21 Despite the enablers, several barriers were identified:

- **Manufacturer Quality Issues:** Manufacturer quality issues presented significant barriers to compliance. In at least two instances, guarantee withdrawal on certain technologies rendered schemes non-viable for the LAs. This represented a substantial financial and operational obstacle to the successful delivery of measures;
- **Household Risk Aversion:** Some LAs reported that properties/households dropped out of the scheme due to risk aversion in achieving compliance for more invasive measures such as solid wall insulation. Installers and LAs need to be aware that customers may resist or be hesitant towards certain measures without clear understanding of what is involved (see Appendix G, Case Study 1);
- **Lack of understanding of required modifications:** Insufficient education, particularly on the importance of required modification for ventilation and related compliance requirements, posed a barrier. For example, when insulation measures are installed, modifications to the house may be required to ensure adequate ventilation (e.g. removing a small section from the bottom of internal doors). When residents are not informed of this and do not agree to this, it hinders measure benefits or may cause residents to drop out during late-stage delivery;
- **Inconsistency of Retrofit Coordinators:** The inconsistency of retrofit coordinators' approaches (dependent on background, training, and level of risk aversion) across different retrofit programs contributed to confusion among LAs. Varied approaches led to inconsistencies and challenges in achieving compliance; and
- **Costs of PAS2035 Requirements:** In a few instances, concerns were raised that contractors might avoid compliance where they can, to maximise profits. The increasing costs for suppliers to comply with PAS2035 measures may mean that without adequate checks, instances of non-compliance may increase – which poses a risk to the quality of measures.

Supply chain experience of the design and installation stages

Roles, responsibilities, and relationships

Relationships with Local Authorities

1.1 Supply chain stakeholders reported that retrofit contracts between the supplier and the client (LA) are led by a project manager (PM) or co-ordinator within the supplier organisation. The supplier PM acts as the primary day-to-day contact, serving as the first contact point for LA clients, overseeing installations and subcontractors (where applicable) and managing a diverse team who are responsible for ensuring PAS compliance and commercial oversight. Overall, the role of the PM or co-ordinator can vary and is highly dependent on factors such as the contract, relationship between LA and supplier, and structure of the delivery team.

1.2 The level of LA involvement varies and, therefore, the supplier-client relationship tends to differ on a case-by-case basis and is often driven by the individual LA's available resource:

- Some LAs prefer a hands-off approach engaging with the supplier PM for periodic progress updates. Some suppliers reported a preference for this approach. When the programme is delivering successfully, they did not feel the need for much input from the LA.
- Other LAs actively engage in critical stages such as beneficiary engagement (marketing, vetting, eligibility, and identification of necessary works). In particular, LAs that had done the groundwork early on led to 'cleaner leads'. The corollary of this was a reduction in the number of dropouts and thus abortive costs during the programme which could have otherwise been significant.
- Whilst broadly LA engagement was viewed as a positive, supply chain stakeholders felt there needed to be a healthy balance. Delivery is optimal when client involvement is not "too involved", which can sometimes slow down the processes and interfere with the operational efficiency of the supplier.
- All highlighted, however, when a programme is more challenging to deliver, it is useful to have more input in terms of risk mitigation or collaborating on ideas to improve marketing or which measures to focus on.

"It [level of engagement] varies across LAs, some take a very keen approach and have in-depth input and some very much set off with scheme and let you run with it report monthly." Turnkey supplier.

1.3 Regardless of the approach taken, supply chain stakeholders highlighted the importance of some degree of client collaboration for successful project outcomes. In particular:

- Evidence from the fieldwork with LAs and beneficiaries similarly place emphasis on this LA involvement. For instance, LAs that deferred to their delivery partner for the responsibility of beneficiary engagement noted that a higher proportion of leads generated were abortive due to eligibility, suitability of the property, beneficiary unacceptance of proposed measures, or skepticism of the scheme by beneficiaries;
- One turnkey supplier felt that dual branding of marketing material helped to engender trust about the retrofit programme with potential beneficiaries; and
- Close collaboration also enabled the supplier to support the client, and feed into strategic discussions regarding retrofit, such as delivery challenges.

"[One LA] just conducted telephone calls or shared email referrals. They didn't do any checks such as EPC or surveying via Google Street View. In one case we had 697 abortive surveys because there were no warm up conversations. That cost falls on [the supplier]. [Another LA] see extensive beneficiary engagement as an overhead covered by the council. So, when a lead comes through [to the supplier] there is a high conversion rate. The beneficiary has already been warmed up. 95% of the time, the retrofit assessment is actually the technical survey which then flows straight into work." Turnkey supplier.

1.4 Some suppliers interviewed – primarily turnkey suppliers – highlighted that they tend to repeatedly work with the same cohort of LAs. Their relationships are based on their reputation for successfully delivering previous programmes, and LAs a will immediately approach them if they secure funding.

1.5 Increasingly, these suppliers will work in partnership with LAs to support the drafting of funding proposals. Initial discussions often pre-empt a funding announcement. Most supplier stakeholders consulted agreed that early involvement in the design of the scheme was preferential, as they were able to draw on their experience of what works, and how quickly and easily these can be delivered.

"To be successful in schemes, it is important to get the mix of measures right. We get some LAs that will go and apply for funding for loads of loft and cavity wall insultation, but it is very difficult to find the properties that need these measures. We send out lead generators to find these properties and find that actually they don't need these measures and still end up having to pay for the lead generators time. Cheaper to install measures are hard to find now. They need to be clever in what measures are proposed and where." Turnkey supplier

Successful implementation in Bradford (anonymous SC)

One supply chain consultee brought to attention the successful implementation of an "room in a roof" (attic conversion) programme in Bradford. They noted that the supplier 'packaged up' a clear and well-branded offering. In their view, programmes are successful when beneficiaries are seen as a 'private retail market' where measures have to be sold, even when there is no associated financial cost to the beneficiary. As the scheme gained traction, and with the help of word of mouth, a very high uptake in the community was achieved.

"The programme was simple to explain [to customers], who knew exactly what they were getting."

This supplier was successful in delivering 1,400 installations. The success of this programme highlights a number of important elements, specifically:

- The importance of clarity when informing and setting expectations for potential beneficiaries about crucial elements such as what the offering is and who the offering is from;
- The simplicity of a programme that is straightforward and avoids confusion; and
- The significance of word of mouth in communities, helping build legitimacy and trust of schemes.

Relationships with subcontractors

1.6 The degree of outsourcing by turnkey suppliers varies. Most, however, tended to outsource retrofit design and installation. Some also outsourced the retrofit coordination role, although noted that they also had in-house resources and were increasingly training up existing staff to

take on this role. This was also in part due to the shortage of retrofit coordinators within the supply chain.

1.7 The turnkey suppliers consulted stated they generally work with subcontractors with whom they have existing relationships and tend to have a well-developed supply chain in all the regions that they work. If they are struggling to identify subcontractors, however, they will often collaborate with the local client to identify any local businesses they can work with.

1.8 Retrofit designers/ architects they subcontract to tend to be well established designers and architects with extensive experience in retrofit and whom they work with regularly. The designers are contracted on the basis of a back-to-back contact with the main contract, they often become part of the project team, and attend internal and client meetings. One supplier noted, however, that if the client has its own designer, they will work with them and it is generally not an issue stating, '*generally we make it work whatever the scenario*.'

1.9 Turnkey suppliers interviewed also had an in-house technical team who would vet all the schemes, make sure they met building regulations, PAS standards and also quality assure the work. Subcontracted designers/ architects also tend to be contracted to inspect the works (RIBA Stage 5) to make sure they have been installed in accordance with the contract. This would include site visits to check on works and liaison with installers.

1.10 Whilst most turnkey suppliers felt that the supply chain was good, a particular gap that was increasingly problematic was finding designers work on schemes that involved multiple measures or 'deep retrofitting' (i.e., air tightness or thermal bridge modelling). They noted that there are only a few design practices currently that can do this type of work which is complex and highly technical.

Subcontractor perspectives

1.11 Suppliers that were subcontracted to turnkey providers repeatedly highlighted how time pressured they felt during the bidding and delivery phases of retrofit programmes. In particular, designers tend to be involved in the proposal stage. One designer interviewed stressed that during the bidding phase, they had very limited time to develop the proposed retrofit plan, and often lacked the level of detail on the properties in view required to make reasonable assumptions regarding types of measures and cost.

1.12 Designers, in particular felt that time for design was always squeezed in the project programme. This means when the bid is won, work has to start very quickly and there is very little flexibility. Delays during the early stages have snowball effects going forwards which affects cost and has cascading impacts on their pipeline of other work. In particular:

- **Significant impact of poor data on properties**: Once the project commences and the designers start to inspect the properties in view or gather more information, it often becomes apparent that the assumptions made at the bid stage are incorrect. This can lead to a significant uplift in cost of the proposed programme. As the Department won't increase the funding, in some cases LAs have had to 'dig deep' to fund the top-up to complete the proposed works. More time for tendering would mean that they could gather more information on the properties in view, have more time to consider the measures and have a more accurate view of cost. One interviewee suggested that ideally, LAs should undertake retrofit assessments prior to bid development. This would ensure measures were appropriate, cost assumptions were more accurate. They did, however, recognise that this would be difficult as the pre-bid assessments would have to be

procured and would have cost implication, which would have to be covered by the LA client; and

- **There is a lot of work that needs to be done straight away** such as planning applications, statutory approval (i.e., how building regulations approval will be approached), gathering information on properties (retrofit survey) and designing individual measures. Designers found they were often having to start design work when retrofit surveys weren't complete or planning applications hadn't been approved. This led aborted work. Occasionally they would have to revise fees, but this is extremely challenging in publicly procured work. A less pressured timescales for delivery – and particularly during the design phase (RIBA Stage 3) – would potentially reduce abortive costs for design work.

1.13 Designers/ architects were regularly subcontracted to the turnkey provider to ensure measures were installed in accordance with the contract. One designer interviewed raised concerns that frequently, measures weren't installed in line with product warranties. Furthermore more, there were regular installation issues – particularly in relation to EWI. Specifically:

- **They didn't feel lead contractor representatives were on site as much as they would expect**, and they often relied on the retrofit designer to carry out quality assurance;
- **Installation of EWI seemed to be particularly problematic**, with installers not paying attention to airtightness. Boards were often installed with gaps which led to thermal bridging. This was viewed as a reflection of the skills shortages in the industry. Installers didn't appear to have a good understanding of the risks of poor installation. Issues such as cold bridging will often go unnoticed, with condensation and performance gaps only becoming apparent in the future. The cost and practicalities of remediation is high as measures are often covered up with rendering; and
- **Despite having raised concerns with the lead contractor, they didn't feel quality issues that they had raised had been rectified.** As their contract was with the lead contractor, they didn't have a link or a route to escalate to the ultimate client, leaving them in an uncomfortable situation.

6.22 Training was viewed as one possible solution to poor installation, but the interviewee felt that opportunities for training are limited. Whilst there are training programmes emerging – Pure House was a cited as one example of good practice – currently there is no incentive for installers to participate. This is especially the case if they can get onsite, install measures, and not be held accountable for their work. Additionally, training requires significant time and financial investment from installers who are often SMEs.

6.23 Another solution would be to appoint an EWI 'air tightness champion' who would continuously check the work as it was in progress, pointing out where there are issues and providing tool-box talks if the corrective works were not done or to the right standard. Good architects tend to do this as they are regulated and have the technical understanding, but this isn't consistently done across projects.

Key delivery successes

6.24 Key delivery successes reported by supply chain stakeholders included;

- **High interest in solar PV:** Beneficiaries tend to be well informed of the benefits of solar, and so this is seen as an "easy sell," whilst other technologies namely ASHP/ Internal and External Wall Insulation can be more challenging to explain to beneficiaries;

- **External and Internal Wall Insulation:** These retrofit measures, although technically challenging in design and often facing planning constraints, are successful, particularly in the social housing sector where there is a guaranteed pipeline for 18 months. However, the private market presents more challenges due to its "peppered" delivery model, i.e., a strategy lacking specific geographic focus within an LA area;
- **Quality control:** Supply chain stakeholders (viz., turnkey suppliers) reported that they have confidence in their robust quality control measures in place. However, this contrasts evidence from subcontractors, beneficiary and LA fieldwork which suggests that in many instances, quality check measures can be highly variable and often insufficient (see Appendix I, Case Study 2);
- **Collaboration with clients:** Effective communication with clients, regular updates on project progress and key metrics were seen to support delivery. Some stakeholders also said they had successfully collaborated with clients on marketing strategies to ensure successful engagement with end-users. Similarly, when LAs know the local area well and do some of the vetting for eligible households, there are fewer abortive costs, compared to when LAs do blanket marketing; and
- **Creation of retrofit packages:** One turnkey supplier highlighted that programmes such as HUG and LAD should be viewed as 'private' markets – i.e., they are intended to 'sell' a product to households. It works well when there is a well-defined package to sell. One supplier noted that they are likely to be involved in schemes where LAs have implemented this strategy, underscoring their ability to be selective in picking involvement in schemes.

"[Whether LAs have a well-defined package to sell] has been a determining factor on whether we want to be involved in the programme. We have walked away from opportunities where this hasn't been done by the client." Turnkey supplier

6.25 In conclusion, supply chain stakeholder consultations highlight the critical importance of support needed for SMEs in the industry, particularly to invest in workforce development, which is needed to ensure sustained support for retrofit schemes moving forwards. Stakeholders reported several key delivery successes, notably the ease and impact of implementation of specific technologies, working with the social housing sector, and the importance of quality control mechanisms. Collaboration with clients has emerged as a crucial factor in supporting delivery success, with effective communication and marketing strategies playing a significant role.

Key challenges for supply chain stakeholders

6.26 Stakeholders noted that the landscape of retrofitting activity, delivered in conjunction with LAs, presents several challenges they must navigate. These range including technical hurdles, regulatory complexities, supply chain limitations, and client engagement challenges. In this context, stakeholders stress the need to understand and address these challenges to improve the likelihood of successful project implementation and desired impacts and outcomes.

6.27 Key challenges in delivery can be categorised as:

- Operational challenges;
- Regulator, compliance, and industry challenges; and
- Client/ beneficiary challenges.

6.28 These are described in more detail in the sub-sections below:

Operational challenges

- **Technical challenges:** Air Source Heat Pump (ASHP) installations were reported to be particularly challenging due to technical challenges such as oversized radiator requirements and planning constraints, especially in densely populated areas or terraced houses. This leads to high dropout rates and increased costs. External and internal wall insulation was also deemed to be technically difficult to deliver, for example, in some cases, roofs must be extended, or windows must be moved for adequate ventilation. This requires planning permission which attracts long delays. Similar to ASHP installations, there also tend to be high drop-out rates if beneficiaries are not informed early on of the extent of works;
- **Challenges in workforce recruitment and training within the retrofit sector**. Labour supply pressures has been driven by historical declines in apprenticeships, further compounded by Brexit-related labour shortages. This resulted in a strain on the availability of skilled workers. In particular the sector had been heavily reliant on European labour (who were often trained to a higher-level). Strategic stakeholders consulted, reported that this was a significant problem for the retrofit market – both in relation to public and privately funded interventions, and there was a need for policy interventions to address labour shortages and cultivate home-grown talent;
- **Need to attract suppliers from RMI market**: One strategic stakeholder consultee noted that since there is no requirement for PAS2035 to be adopted within the private market and retrofit works outside public sector schemes are rarely adhering to this standard. Indeed, PAS2035 certification is often dismissed by suppliers within the "able-to-pay"/ RMI market as being a costly and unnecessary step. However, one consultee noted that if the government provided a 'stick' requiring all retrofit works to adhere to PAS2035 (i.e., through Building Regulations), this would incentivise the RMI sector to invest in training, and also open up their skills to the public sector market.[17] It was noted that some intermediaries would even consider providing their members with free training if this was mandated. LAs tend to work with large national companies due to the scale of retrofit programmes, but working with local SMEs could have a significant impact on regional economic growth and local skills development. This is significant as the future workforce tends to come from SMEs rather than major contractors. LAs could incentivise this through social value requirements during the procurement process;
- **Timescales to deliver the works**: Funding announcements are often delayed which then impacts them delivering retrofit measures in time. In addition, the delivery period is seen as unrealistic. Projects rarely start from the first 'official' day of schemes due to the preliminary work that needs to be completed by LAs and the supply chain. Notice of extensions need to be given a minimum of 6 months in advance. This is because supply chains move on before they finish one piece of work, and advanced notices helps them manage their pipeline. Procurement also always takes longer than expected; and
- **Increased costs:** The change from PAS2019 to PAS2030 made delivery more expensive due to technical requirements. Next year retrofit coordination will be impacted by the change in PAS requirements.

[17] The consultee did note, however, that Trustmark were discussing the development of a new standard called 'Licence Plus' aimed at all trades, which was effectively a PAS2035 lite. They argued this would be a practical way to ensure all retrofitting outside public sector programmes were done to a good standard. If there aren't standards, then there will be problems going forward.

Regulatory, compliance and industry challenges

- **Compliance standards:** Stakeholders note that they are diligent about ensuring up-to-date compliance with standards such as PAS2035. However, because of the constantly evolving requirements of these standards, there is nervousness and confusion, even in large established providers, around compliance requirements, potentially compromising the quality of retrofit measures;
- **Issues with the District Network Operator (DNO)**: Stakeholders flagged that they often need to wait up to 6 months for planning approvals from the DNO. This has added complexities when working on a block of properties, as they have to apply and connect all homes to the DNO with individual approval processes. The speed at which DNOs provide feedback is something that could be improved significantly; however, stakeholders acknowledge that many councils do not have the relationship or the power to influence this;
- **EPC caps:** Similarly to ever-changing compliance standards, EPC caps are considered "a bit of a moving goalpost." One stakeholder notes that the 'goals' keep changing nationally in response to national challenges, and LA evidence corroborates this as there have been communication barriers that have created confusion around the EPC caps for schemes;
- **Low sentiment towards investment in training.** All stakeholders consulted raised the issue of lack of continuity of retrofit programmes as a significant barrier to further development of the supply chain, including investment into training. Several strategic stakeholders highlighted that the 'stop-start' approach to public sector funded retrofit schemes and initiatives aimed at the 'able-to-pay market' such as Green Deal (2012-15) and Green Homes Grant Voucher Scheme (2020-21) has meant that sentiment towards investment into training is lacking across the supply chain. This is particularly notable within RMI (repair, maintenance, and investment) SMEs (small and medium-sized enterprises). Consultees advocated for policy developments to incentivise SMEs to invest in workforce development, emphasising the role of SMEs in shaping the industry's future workforce;
- **The absence of vocational/occupational standards**. Strategic stakeholders argued that the vast majority of the sector were not well trained or educated. Traditionally roles are very siloed with very narrow job roles, '*they are often trained to do one simple task*'. This contrasts with neighbouring countries in Europe – where training tends to have a broader focus. Without an integrated perspective, there are many ways in which the energy performance of installed measures can be undermined. Whilst the new retrofit coordinator role defined by PAS2035 seeks to do this, the role is yet to be deeply embedded in the industry and is an extremely challenging role. A better way would be to uplift the skills of the sector through a vocational standard for the workforce. The corollary of this would be to improve the jobs and job prospects – potentially attractive entrants to the workforce. In advance of having minimum standards for building performance and occupational standards, one interviewee suggested that at the regional level, a group of LAs or a Combined Authority could create a coalition of the willing to develop their own standards and encourage their suppliers to sign up to a voluntary charter. The public sector could leverage its buying power to encourage signatories, and if there was funding to trial it, the lessons learned could inform future policy. Other countries have a broader range of stakeholders informing skills policy rather than just industry, and this is something that could be replicated in the UK (where skills policy tends to be industry led) on a small-scale, trialed and scaled up;

- **Lack of diversity in the workforce**: Currently only about 2% of people within the RMI sector are women. One interviewee stated that recruitment within the sector hasn't really kept up with the times, and there needs to be an effort to address gender imbalances. This will, however, require a paradigm shift in recruitment practices and industry image; and
- **Challenges of bringing new products to the market**: One interviewee highlighted the challenges of introducing new products to the market. All technologies used in public-funded retrofit programmes must be recognised within SAP. The Product Characteristics Database (PCBD) is really aimed for another product of the same type – for example if a new model of ASHP was launched with a difference performance profile. This process is not particularly onerous, but it still has to be approved and reviewed by an independent laboratory such as BRE. If, however, a new category of technology is developed – this needs to be added to Appendix Q of SAP, and the process can take 18 months or more and cost around £100k-£200k. This is a constraint for many small businesses due to cost and the period of time that the new product cannot be used more widely.

Client/beneficiary challenges

- **Client understanding and engagement:** Some beneficiaries struggle with understanding the technical aspects of retrofit measures, leading to misconceptions and dissatisfaction among residents. There is a need for improved beneficiary engagement and education on all measure types to align expectations with project outcomes;
- **Aesthetic concerns**: Retrofitting older properties, especially those in conservation areas or listed buildings, presents design challenges, particularly concerning the appearance of large measures like external wall insulation. Finding solutions that balance energy efficiency with aesthetic considerations remains a key challenge in retrofit projects;
- **Dropouts due to measure preferences**: Beneficiaries sometimes have strong preferences or views on the measures that they want, versus what their property needs. For example, beneficiaries might want loft insulation but do not want trickle vents on the walls. This calls for a need for better education on all measure types. ASHPs have especially high dropout rates due to the extensiveness of work, and because they can lead to higher energy costs compared to gas central heating;
- **Lack of understanding of the housing stock**: LAs often do not know their housing stock very well and the information they have can be out of date. Using this inaccurate information can lead to expectations for delivery, which are often very different from the end outcome. LAs could improve on this by collecting better data about their housing stock and gathering accurate data through surveys; and
- **Funding restrictions per client:** The funding cap per property serves as the most significant barrier for retrofitting privately owned properties. The demand for additional financial mechanisms to support various segments within the owner-occupied sector is evident. Innovative finance mechanisms could help pay for the full breadth of work that a property needs for it to be at its optimal performance. Stakeholders note that such finance mechanisms would increase cost efficiencies of a retrofit, but also support national retrofit and domestic sector decarbonisation targets.

Supply chain's understanding of PAS/TrustMark standards

6.29 Supply chain stakeholders recognise the importance of maintaining quality standards and emphasised that PAS requirements helped maintain quality of their delivery, which is central to their offer to LAs. However, from their perspective, there is significant concern regarding the overall cost associated with the PAS requirements and the costs in both time and money

associated with the upkeep of sporadic changes. While acknowledging the improvements in quality and the mitigation of previous issues that existed when regulations were more relaxed, there is a suggestion that the administrative aspects of PAS need to be reviewed. Specifically, stakeholders felt that changes within PAS requirements should not be made without prior consultation and appropriate communications, as this results in the supply chain constantly operating in a reactive way to keep up with consistent changes. It is worth noting that the most recent PAS2035 updates did undergo consultation.

"PAS was a challenge at the time when it was quite new, but now it has improved the quality of delivery" – LA focus group

Capacity to deliver PAS/TrustMark compliant measures

6.30 Supply chain organisations are facing challenges regarding their capacity to deliver PAS/TrustMark compliant measures. The implementation of PAS standards was described as a significant cost burden, with the process being deemed overly complex and time-consuming. The introduction of new requirements, such as the TrustMark portal upgrade, have also led to a notable increase in costs, both in terms of financial expenditure and time investment. This suggests that the organisations are struggling to allocate sufficient resource and capacity to meet the demands of PAS compliance effectively, on an ongoing basis.

6.31 Furthermore, the shortage of retrofit design and retrofit coordinators indicates a limitation in the organisation's capacity to manage and coordinate retrofitting projects in accordance with PAS/TrustMark standards. Training can be costly. Whilst Tier 1 suppliers do invest in training in-house, smaller (i.e., SME) suppliers are often reluctant to invest in training – either because they are unable to resource training (time and cost) or there is a lack of trust in policy certainty (failure of Green Homes Grant Scheme/ Green Deal) and they are unwilling to commit investment when returns are viewed as uncertain. Interviewees highlighted concerns about the overall capacity of the supply chain, noting a shortage of skilled workers – much of the construction workforce is over the age of 55 and workers are leaving the roles at a higher rate than those coming in. Adding to this, there is a lack of apprenticeships to encourage new entrants in the workforce and replenish these roles adequately.

6.32 This shortage in capacity has the potential to impede on supply chain organisations' ability to deliver PAS/TrustMark compliant measures, as they may struggle to secure the necessary expertise, staff, and resources to meet the required standards and demand for increasing retrofit activity.

Barriers to delivery of PAS compliant measures

6.33 Supply chain stakeholders noted that navigating through the complexities of implementing regulatory compliant retrofit measures involves various barriers. Specifically, they noted that:

- **PAS requirements can be open to interpretation:** PAS standards, particularly concerning measures like External Wall Insulation (EWI), can be subject to interpretation. Improper installation can lead to thermal bridging which can lead to condensation and mold growth. However, ensuring correct installation can significantly increase costs;
- **Lack of communication**: some measures can be disruptive, and PAS dictates that properties must get to a certain ventilation level to have Internal or External Wall Insulation. Not only are these measures disruptive, but they also require additional

measures such as kitchen and bathroom fans. When not communicated effectively, this leads to a high dropout rate. Thus, communication is key, so consumers understand why additional albeit disruptive measures need to be put in place;

- **PAS2035 regulations in the private sector:** There is no requirement for PAS2035 within the private sector and is often dismissed as an unnecessary additional cost. If the government were to make it compulsory for all retrofit improvements to follow PAS2035, this would lead to widespread upskilling within the domestic RMI (repair, maintenance and improvements) market, and better quality of private sector installation. This would also increase the number of smaller, local suppliers available to support public-sector retrofit programmes; and
- **Lack of practical advice:** while PAS2035 provides systems-based guidance, there is a need for practical advice on the ground to support the supply chain, to ensure that energy efficiency measures are retrofitted correctly. This would also ensure that organisations are supported when updates are made to PAS requirements.

Beneficiary experience of the installation of measures

Positives

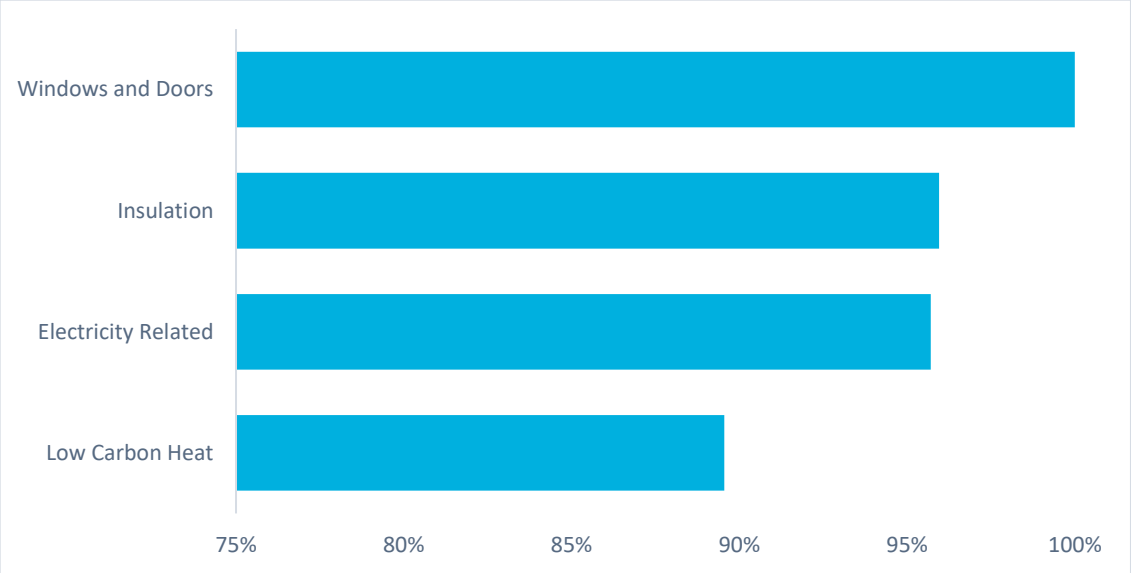
6.34 When the installation has gone well (which typically means not taking long, leaving no mess or damage and everything being returned to how it was) and the measure (e.g. in-roof insulation, cavity wall, or solar panels when they work) needs no ongoing maintenance then respondents have very little to say.

> *"My experience has been pretty positive, free and cheap to run" – heat pumps, focus group*

6.35 Common words used when the process has been positive were efficient, quick, easy, friendly, helpful, timely, well-informed, knowledgeable, professional, polite, reliable, tidy (workmen and the finish), lucky, warmer, and grateful. Moreover, 48% of participants in the beneficiary survey described the installation process as 'Excellent', and a further 28% described it as 'Very Good'.

6.36 Survey respondents supported that the process was timely, having reported that measures were installed promptly, with very little taking more than 6 months, regardless of measure type. Figure 6-1 below shows the breakdown of beneficiaries who received their measures within six months by type of technology installed.

Figure 6-1: Percentage of beneficiaries who received measures in less than 6 months (Window and Doors n=6, Insulation n=99, Electricity Related n=163, Low Carbon Heat n=67)



Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

6.37 Of the 16 LAs in the North East and Yorkshire region, five had every reported installation completed within six months. These five (in order of the number of total installations in each) were: City of Bradford (26), Darlington (19), Hartlepool (16), Wakefield (15), and Doncaster Council (1). These timely installations may have played a part in the positive sentiment beneficiaries felt towards these LAs, with between 69% and 100% of beneficiaries recommending their LA with regards to the measures installed. Wakefield beneficiaries were most positive, with 15 out of 15 recommending their LA. Additionally, of those who reported having the choice of measures installed being mostly or completely their own and who discussed the options of these measures with their LA, 15 out of 17 stated they were able to make an informed choice.

6.38 The process tends to be positively reviewed when beneficiaries know what is going to happen, who is going to be in their homes, when they are arriving, how long it will take, what is involved and if the end finish looks good.

6.39 When the process has worked well and especially when the measures installed are simple (e.g. windows or insulation), households have little to say beyond being pleased to get something added to their property for free.

"They did really well. I left them to it. They've done a good job … turned up on time and tidied up after themselves" – 66+, wall and loft insulation, Bradford

"Everything went smoothly, pretty seamless [Switch Energy Network]" – 66+, solar, Sheffield

6.40 There were more issues with more complex measures (especially heat pumps) but even with such measures there are some households who are very satisfied with what has been installed and the difference it has made to them and their energy bills (see Appendix I, Case Study 4).

"I found the guys who came to install the radiators and the boiler very friendly, very helpful and the other word I was thinking about was free. I didn't have the money to get the radiators installed, I've never had radiators throughout the house so for me, the fact that it didn't cost us a penny, really suited me and it was great to finally get them done" – heat pump focus group

6.41 The interactions with staff and contractors are absolutely key in providing a positive or negative experience. Residents want and expect the measures to be installed in a timely fashion. When contractors have let them know when they will arrive and how long the job will take, have then arrived on time, and finished the job when they stated, with a hard-working team doing a full day's work on site then the experience has been positive.

"The scaffolding was up in less than a few hours. They were here all of one day to do the wiring and the next day they put the solar panels up … so it was all good, it was all done and dusted straight away" – 18-35, solar, Wakefield

6.42 Staff are positively reviewed when they have worked hard, have been friendly, polite, and tidy, and when they have taken time to explain how the measures work (see Appendix I, Case Study 6).

"It was positive. We got a full explanation of how the heat pump worked. Got the full explanation on how to control the new boiler and all that. Made sure we knew, here's the dead basics and if you want to know more, you've got a booklet on this. They said you'll get your paperwork in due time as well, so you'll know that it's all sorted, above board and everything" – 18-35, hybrid heat pump & boiler, Sunderland

"Absolutely excellent … I was extremely happy actually. They [Solar Daddy] were so friendly and they were so professional … one day to put up scaffolding, a few days gap, then solar panels put up in one day" - 66+, solar, Richmondshire

6.43 Being tidy and respectful of residents' houses was an important quality marque.

"They put coverings down for whenever they were walking through the house. I've dealt with workmen before who don't have that bit of

foresight, so that was really nice to see" – 18-35, hybrid heat pump & boiler, Sunderland

"Then at the end of the job they took the plastic up and sent a professional carpet cleaner … they made sure there were no bits about and everything like that. They were very, very professional" – 66+, external solid wall insulation, Calderdale

6.44 Ultimately, a positively rated installation is one where there is no drama, no issues, with little to say because it has just worked as beneficiaries expected. Contractors do not have to go above and beyond to satisfy beneficiaries, but just be friendly, respectful, communicative and install the measure(s) to a good standard.

Issues

6.45 Those with negative experiences had a lot more to say than those where measures had been installed without any problems.

6.46 Common words used were frustrating, lack of information, rude, slow, delayed, chaotic, anger, useless, mess, disappointing, expensive, chaotic, disruptive, ongoing problems, and relief (when finally done). These words display a much stronger and deeper level of emotional intensity than the words selected by residents where the installation process has worked well. There appears to have been a lack of communication and no clear names or channels for who to contact should there be any problems. This is a long-term issue that keeps recurring, indicating that the role of retrofit coordinator doesn't seem to resolve it. From the beneficiary survey, communication with installers throughout the installation was highlighted as the biggest issue for residents, with 14% stating communication was poor or very poor.

6.47 There is a perception that some LAs have procured the cheapest rather than the best quality contractors; with these contractors then struggling to fulfil the work without cutting corners. A couple of beneficiaries who had had negative experiences spontaneously commented that they felt the guaranteed income for doing this work gave the contractor's license to be slow and take little care as they were being paid regardless of when and how each job was finished.

"When the job started turning into being a nightmare, I looked into Everwarm, googled them and the list of complaints for that company were horrendous" – 51-65, external solid wall insulation, Doncaster

"Get some decent flippin' plasterers and decent tradesmen in, they [Eclipse] must have just been getting the cheapest ones about. They could have had it all done within a week with the army of people they had but it just got dragged out. It took a couple of months, back and forth, back and forth. The work they've done was crap" – 36-50, roof insulation, Calderdale

"I felt that they were a really slap-happy company [Better Homes], the people who they use were there just to get a job done, they weren't bothered about the fact that it was somebody's home. They ripped the wallpaper, left marks on the walls and if you ask them anything you got a short answer. They didn't have any customer service skills" – 51-65, air source heat pump, Stockton-on-Tees

6.48 Although the quotes throughout include the name of the contractors, when beneficiaries recalled or knew who they were, the number of different companies cited suggests the issues are much broader than just one LA area or with just one or two businesses.

6.49 Issues arise and get exaggerated when contractors are unfriendly, un-communicative, or do not take responsibility or care with the installation (see Appendix I, Case Study 3). Where beneficiaries had an issue, this tended to spiral into several other problems, as the initial problems weren't resolved. Those who are upset with the installation often had several things to say about the process which seems to have turned into a catalogue of issues.

6.50 There were many examples cited of contractors being thoughtless and sloppy, which caused a great deal of frustration and exasperation with what they see as a lack of care and professionalism.

"It was 10 days before the scaffolders turned up. When these guys came with scaffolding, I said I've got a conservatory extension on the back that I built myself many years ago, it's got a pitched roof on an angle, timber trusses, plywood on top of that, then felt shingles. I said I want you to bridge over it, so you are not putting any weight on that roof. Oh yeah, not a problem; when I came back to have a look, they'd not bridged over it, they'd put feet onto it so some of the weight of the scaffolding was being supported by my conservatory roof" – 51-65, external solid wall insulation, Doncaster

6.51 For several elderly residents, the switch for the air source heat pump was installed in their loft, despite asking to have it positioned downstairs where it could be easily accessible. There is a need for more thought, care, and consideration, rather than doing what is quicker or easier for the installer.

6.52 Some households experienced contractors working in a 'piecemeal' fashion – for example, turning up for a few hours before disappearing to another job, and then not coming back for a few days (see Appendix I, Case Study 5). This again gives the impression that they are under-resourced or have taken on too many jobs (reflecting the possible issues with the procurement process that several beneficiaries mentioned).

"You got at best three hours in the afternoon or three hours in the morning, they weren't here very much longer than that. They had just

taken on so many different jobs that they were skipping from one to the next" – 51-65, external solid wall insulation and boiler, Doncaster

6.53 A few residents complained about work teams not speaking English or only having one person with limited English (the perception is they are Eastern Europeans). They want at least the foreman or on-site manager to be able to communicate clearly with them. Not just in these cases but across many of the interviews there is a desire to talk to the contractors about the measures, what they are having fitted, how they work and if they need to do anything to get the most out of them – this level of communication appears to be missing.

"Every single one of them was foreign, no-one spoke English, communicating with them was nightmare … [contractor was called Swift something I think]" – 51-65, external solid wall insulation and boiler, Darlington

"[With] foreign workers … you tend to get a bit frustrated, you know, when you can get your point across" – 66+, external solid wall insulation, Calderdale

6.54 There were also questions raised amongst some beneficiaries who had contractors come from what they considered to be a long way away (for example coming from Manchester or Liverpool for work being done in the North East). They would have thought a more local company would have been used. It also makes them feel the contractors don't care as they are from so far away and won't come back to resolve any issues.

6.55 There were many examples of property damage, through low levels of care, attention and thought. When contractors have been challenged, they have denied any responsibility and refused to rectify the problems. Often any damage is not noticed at the time or is unseen for a while (such as broken roof tiles) but has caused problems later on. This issue was much more than an isolated or one-off incident. There is an acceptance that problems can occur, but the annoyance comes from the carelessness which allowed it to happen, then not owning up to any issues, then not taking responsibility and resolving the problem.

"They broke the canopy on top of the door, I mean it is wood and it is artificial, but they damaged that, and I'll probably get done for that by my landlord but they never rang me back [when complained], never booked another appointment so I just left it" – 18-35, solar, Wakefield

"They treated it like a worksite rather than a home. My [elderly disabled] mum had had a stairlift put in and with all the stuff they were taking upstairs we heard a really bad noise but then nothing was said. But they'd actually broken the stairlift which is a massive thing because how do I get my mom to bed … I think what annoys me the most is that they [Better Homes contractors] should have come and said this has happened, it's an

accident, it's the fact that they just ignored it" – 51-65, air source heat pump, Stockton-on-Tees

"Damaged one of my fruit trees, knocked down one of the raised beds, and also damaged the back gate [whilst doing the installation]" – 51-65, solar, Leeds

6.56 In addition to physical damage, it was common for residents who had had a poor experience to complain about the mess contractors made, again with little care or thought about being tidy or properly cleaning up after them (see Appendix I, Case Study 3).

6.57 A recurring issue across different areas was with scaffolding on some jobs being put up and left for weeks or not taken down for a long time after the measure(s) have been installed. Again, it reflects a poor level of communication with beneficiaries and a poor level of organisation between the contractors and the scaffolders. Despite beneficiaries contacting the contractors, those who experienced this issue felt no one was taking ownership or responsibility to resolve things.

"When they had done it all we still had the scaffolding, I kept saying when is somebody coming to take it down? In the end, I phoned up the scaffolding company myself, who said we've been waiting for that scaffolding. I replied 'you can come and take it down whenever you want'" – 51-65, external solid wall insulation, Doncaster

"I mean, it was so bad, they came and put the scaffolding up and after three weeks they still hadn't started work" – 51-65, external solid wall insulation and boiler, Doncaster

" The scaffolding stayed up for about 5 weeks after and I kept ringing the company asking them to come and take it down" – 36-50, solar, Hambleton

Key learnings

6.58 Based on the findings relating to delivery and installation, the following areas for improvement have been identified:

- **Increased Local Authority involvement:** Address the strong desire for enhanced LA involvement during installation to provide better oversight, this needs to be paired with adequate resource for LAs to do this.
- **Standardised retrofit coordination:** Set clear criteria for retrofit coordinators to ensure consistency in their roles and expectations so that LA can better hold retrofit coordinators accountable.

- **Refinement of procurement system:** Develop and refine the procurement system to ensure contracts are awarded to contractors with sufficient resources, capacity, and quality standards, fostering consistency and reliability in installations.
- **Contractor accountability and standards:** Implement procedures to ensure contractors deliver a consistent and suitable standard of work, emphasising the importance of professionalism and adherence to agreed standards.
- **Enhanced communication and support for beneficiaries:** Provide beneficiaries with a single point of contact throughout the process and ensure clear communication regarding the installation process, access requirements, and post-installation support.
- **Feedback mechanisms and information provision:** Develop a quick and easy feedback system for beneficiaries to monitor contractor performance and rectify immediate issues. Provide comprehensive verbal explanations, written instructions, and visual aids to aid beneficiaries in understanding and using installed measures effectively.
- **Improved oversight and accountability:** Strengthen LA involvement and oversight to ensure proper installation and utilisation of funds, addressing the current lack of accountability and involvement beyond initial beneficiary engagement stages.
- **Monthly reporting:** Regular reporting is vital for tracking progress, identifying challenges as they emerge, and ensuring compliance with scheme requirements, although clarity and timeliness can be improved.
- **Regular meetings:** Meetings between LAs and overseeing bodies promote open communication, problem-solving, and relationship building, with face-to-face interactions often yielding better support.
- **Monitoring information**: Monitoring information such as measures installed serves to track progress, support funding arguments, and enable adjustments to schemes based on identified issues, but there is a need to ensure comprehensive data collection for a holistic view of scheme impact.
- **Consideration of alternative metrics**: Exploring metrics such as actual energy usage and qualitative indicators like customer satisfaction, can offer more meaningful insights into scheme outcomes, complementing traditional quantitative KPIs.

7 Post-installation and Monitoring

Introduction

7.1 This chapter explores the experiences of beneficiaries living with the installed measures, including perspectives on the benefits and challenges living with measures. It also examines key areas of concern raised by beneficiaries, such as aftercare and communication.

Beneficiary experiences of living with installed measures

Overall satisfaction

7.2 Ultimately, the respondents who had a good experience with the scheme often had little else to say about the post-installation stage beyond highlighting the benefits they received and their gratitude. Those who had poor experiences were often able to speak at greater length about their experiences with the scheme and recalled the issues they had had in detail. Therefore, it is worth bearing in mind that, when compared to the positives, the number of different issues with the scheme is not necessarily a reflection of the number of people who were dissatisfied.

"Overall, it was really good. I wouldn't give it 10 out of 10. You know, more like a nine. It would be really close, just a few little things [to improve] you know" - 36-50, low carbon heat pump, Stockton-on-Tees

7.3 Additionally, apart from analysing the perspectives of our entire sample, we examined the opinions of beneficiaries regarding the scheme in both Wave 1 and Wave 2 of our fieldwork research. We investigated whether people's views underwent any changes during the six-month period between waves, which coincided with part of the winter season. The findings are illustrated in Figure 7-17-1 below. The percentages in the figure below represent the proportion of respondents who reported a specific combination of opinions on their satisfaction levels in Wave 1 and Wave 2. For example, the top left cell indicates that 3% of the sample were 'Very Dissatisfied' in both Wave 1 and Wave 2, while the top right box shows that 1% of respondents reported being 'Very Dissatisfied' in Wave 1, while 'Very Satisfied' in wave 2. The red cells highlight where an opinion from a beneficiary has gotten worse from Wave 1 to Wave 2, grey indicates no change, and green highlighted cells indicate an improved opinion. The findings show that while many beneficiaries maintained their view that they were very satisfied with the scheme overall, of those whose opinions changed between research waves, more changed their views for the worse. This is in line with the negative experiences of aftercare, as explored in the following 'issues' section, suggesting that over this period the lack of aftercare caused people to become unhappier.

Figure 7-1: Overall, how satisfied are beneficiaries with their installed measures (n=74)

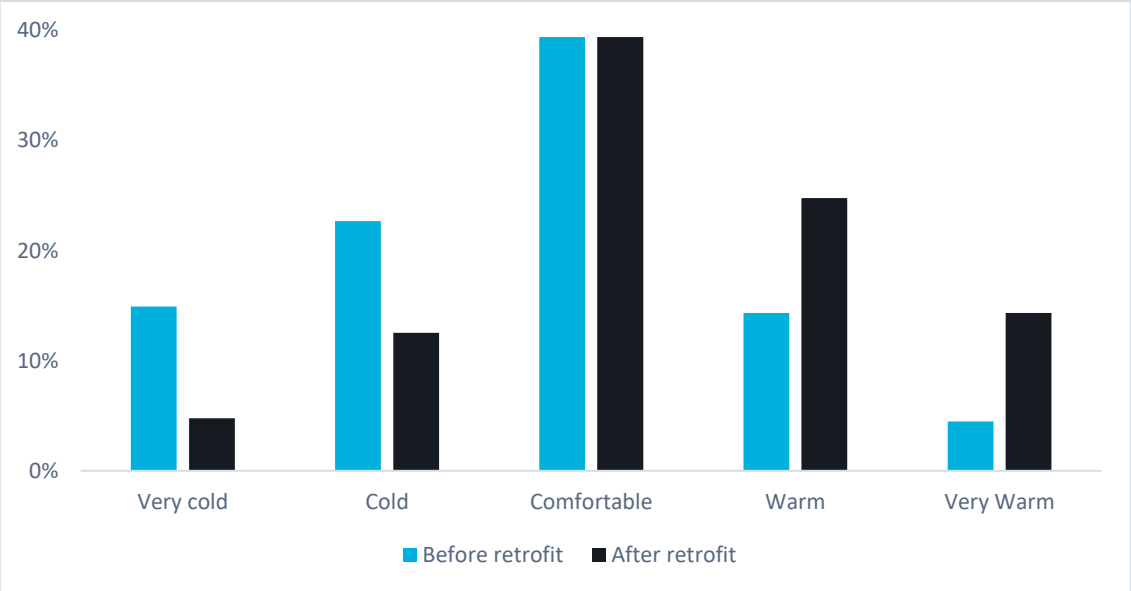
Wave 1 \ Wave 2	Very Dissatisfied	Quite Dissatisfied	Neither Satisfied or Dissatisfied	Quite Satisfied	Very Satisfied
Very Dissatisfied	3% (2)	-	-	-	1% (1)
Quite Dissatisfied	3% (2)	-	5% (4)	-	3% (2)
Neither satisfied or dissatisfied	1% (1)	-	1% (1)	-	-
Quite satisfied	-	3% (2)	7% (5)	12% (9)	8% (6)
Very satisfied	1% (1)	-	1% (1)	12% (9)	38% (28)

Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

Thermal comfort

7.4 As part of our survey, beneficiaries were asked to recall, in terms of temperature, the typical conditions in their home during winter before and after measures were installed. As shown in Figure 7-2, residents reported a positive shift in home temperature post-installation. Insights on comfort are derived from user perception through self-reported questions and have not been cross-checked against actual data from temperature sensors.

Figure 7-2: Temperature conditions during winter, before and after installation (n=335)



Steer-ED analysis of Wave 1 and 2 beneficiary survey

7.5 The most dramatic change in temperature conditions by dwelling type came from measures installed in terrace homes (including end-terrace) which experienced a large positive shift in internal comfort post-installation. Beneficiaries largely focussed on the financial benefits of their measure. Several homeowners were happy that the installation of retrofit measures had raised the value of their property. Those who had external wall insulation installed often stated that it had also improved the appearance of their house.

Product guarantees

7.6 The beneficiaries who received a warranty or a product guarantee saw this as a useful addition, although most were not aware that they would receive this until it was posted or emailed to them. This could be due to poor communication or the respondents being unable to recall all the information provided to them during the initial assessment. Regardless, providing clear information about a measure's warranty upfront could provide an extra incentive for future applicants and help assuage any doubts or concerns about the scheme.

Environmental benefits

7.7 Despite the scheme aiming to reduce carbon emissions through the retrofitting measures, most respondents did not refer to the environmental benefits that the measures had provided unless prompted. Even when prompted, the environmental benefits were largely mentioned as an afterthought, in comparison to the financial benefits. Respondents spoke about their contribution to the environment in general and did not mention phrases such as "net zero" or "low emissions". This suggests that the objective of the scheme, to help people on low incomes reduce their carbon emissions, was poorly communicated, or was not a priority for respondents, perhaps this was obscured by the financial reasons for taking the measures.

Changes in energy bills and usage

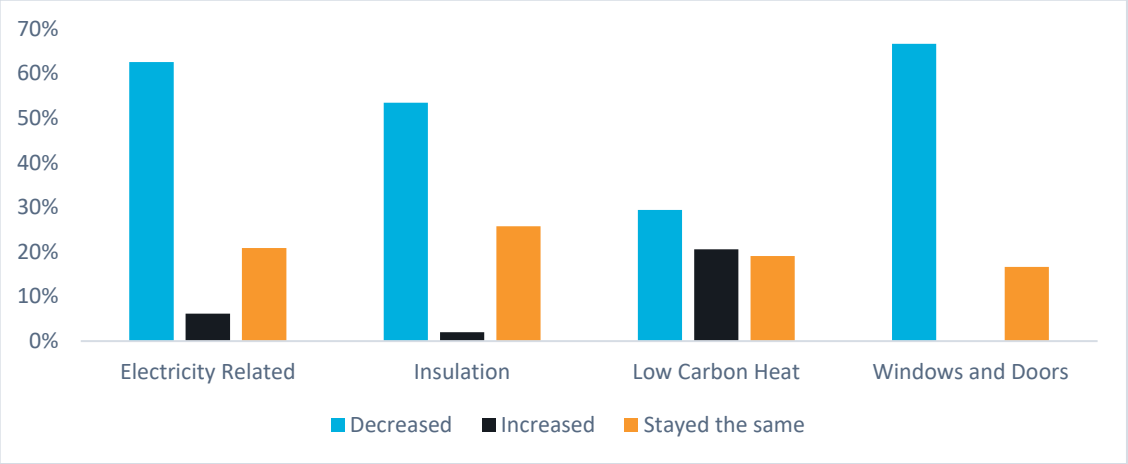
7.8 Although the measures did tend to reduce beneficiaries' energy bills and save them money, the savings were often lower than expected. Whilst this could be an issue of communication and setting realistic expectations, it is important to consider that the retrofitting measures were installed in 2022, during the cost-of-living crisis. Many respondents found it hard to state how much they had saved as their energy bills had risen since the measures were installed. For some, the reduction in the amount of energy required to heat their home was confused with the costs of their energy bills, so they believe the measure(s) installed have made little difference, without appreciating how much more their energy bills would have been without these.

"It's tricky because obviously the bill's going up, but I don't feel a need to put the heating on quite so much" – 35-60, room in roof insulation, Calderdale

7.9 As part of our beneficiary survey, we asked recipients of measures what their energy usage has been since they received the measures, shown below in Figure 7-3. For electricity related measures, insulation, and windows and doors (although, important to recognise the sample size for this measure was 6), the majority of beneficiaries reported a decrease in their energy usage. However, the findings for low carbon heat measures were less positive, with just 29% reporting reduction in energy use and 21% reporting an increase in energy use. The survey

also found that there was no difference in response to this question when the same beneficiaries were asked this in wave 1 and wave 2.

Figure 7-3: Energy usage since receiving retrofit measures (Electricity Related n=163, Insulation n=101, Low Carbon Heat n=68, Windows and Doors n=6)



Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

7.10 Much like the findings from our survey, the beneficiary interviews also highlighted concerns over the effectiveness of low carbon heating measures. Several households who had air source heat pumps installed do not feel they have saved financially, with several saying their energy bills have gone up compared to when they heated their house via a gas boiler. They had also subsequently read this when doing a Google search about this measure.

"Gas is the cheapest, so I've tried not to have it on [air source heat pump]. If it does cost as much as we have heard I won't put it on this winter. People have told me it costs a lot, and you don't get much heat out of them as they say you will" – 66+, boiler, loft insulation and air source heat pump, Redcar & Cleveland

Lack of aftercare

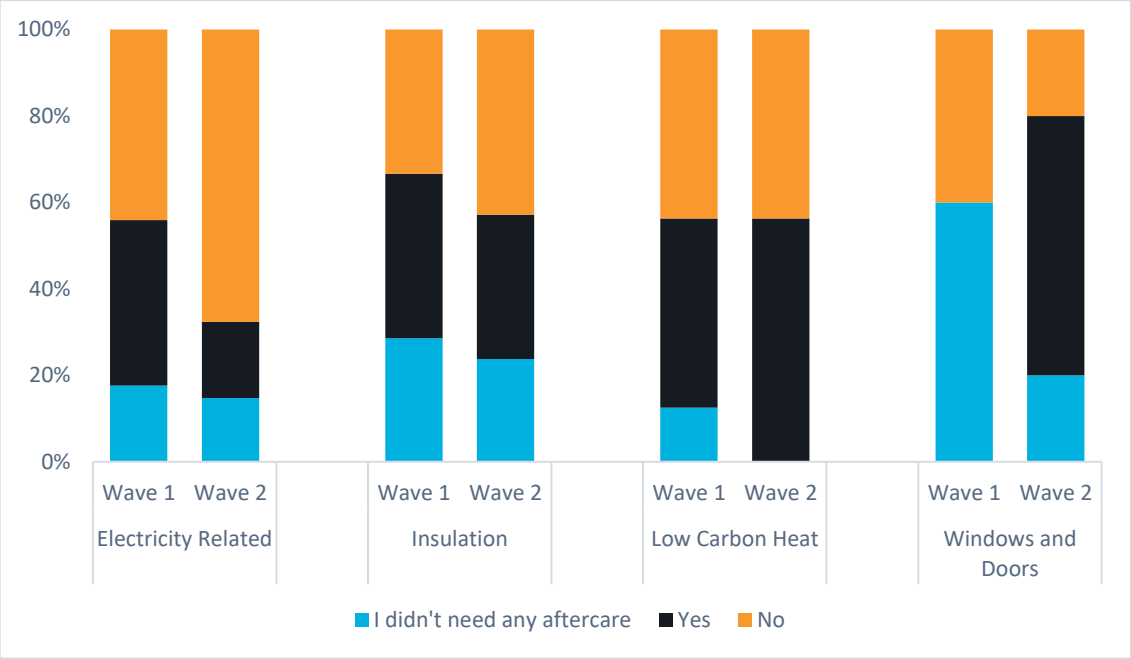
7.11 Beneficiaries frequently stated that they felt let down by the lack of contact after the installation (see Appendix I, Case Study 2). They were not given a named contact whom they could get back in touch with if they had any issues, concerns or questions once the installation was finished. Therefore, if issues did arise, there was confusion over whom to contact. This was exacerbated by the lack of coordination between private installers, LAs and energy companies. When describing how they attempted to contact people for help, respondents often resorted to emotive language, emphasising their frustration and anger. This suggests that the lengthy, confusing process of trying to find someone who could help was often more of a problem than the issue itself.

"I wasn't happy with their service. At one point I got so annoyed, I'm quite even-tempered, I got so annoyed … this is disgusting" – 51-65, air source heat pump, Stockton-on-Tees

7.12 Some measures, such as solar panels and air source heat pumps, which are more technical and newer to recipients (compared to, for example, insulation), were not explained to beneficiaries in sufficient detail. This meant that some respondents were unable to use them effectively. The complexities of these technologies are supported by the beneficiary survey, where just 9% of recipients of low carbon heating measures (which include solar panels and ASHPs) reported that they did not require aftercare.

7.13 Figure 7-4 below shows findings from our beneficiary survey of those who were asked whether they received adequate aftercare after installations of measures. The sample reported is those who answered in both wave 1 (left bar) and wave 2 (right bar). The findings are consistent with the beneficiary interviews, showing that as time went on, more recipients of measures (predominantly those with electricity related or insulation measures) were dissatisfied with the level of aftercare they were receiving. Moreover, the findings show there was a trend of more recipients realising their need for aftercare as time went on.

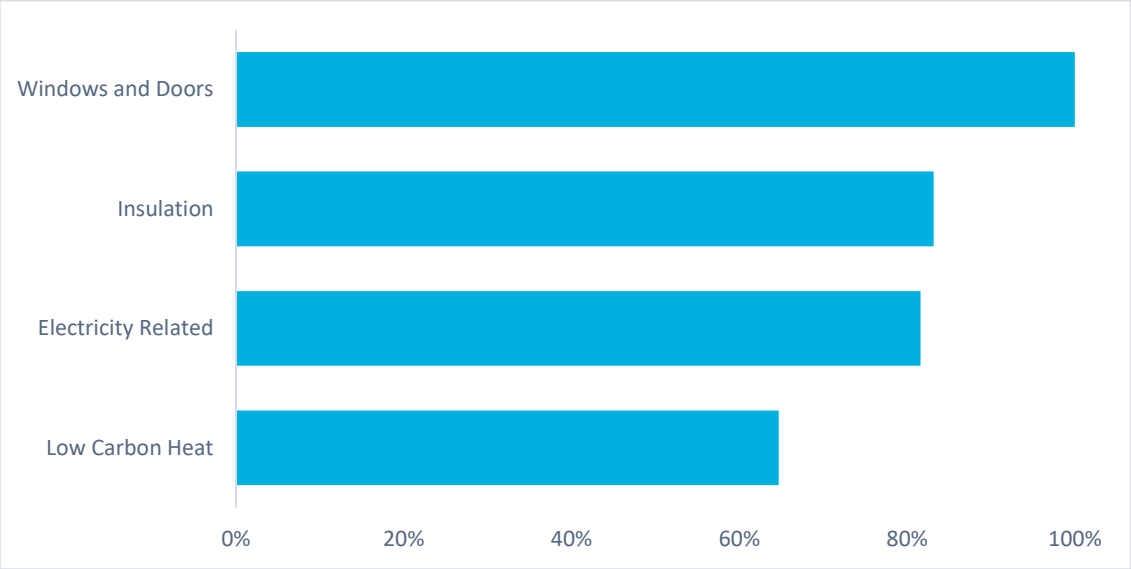
Figure 7-4: Do you feel you received adequate support or aftercare after installation of measures (Electricity related n=34, Insulation n=21, Low Carbon Heat n=16, Windows and Doors n=5)



Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

7.14 Our survey did find that, overall, the majority of beneficiaries were happy with their installed measures as shown in Figure ; however, it is important to note that the recent winters have been mild, which may influence current sentiment towards the effectiveness of installed measures. Once again, however, low carbon heating technologies are found to have been viewed less positively by beneficiaries than others.

Figure 7-5: Percentage of beneficiaries 'quite satisfied' or 'very satisfied' with the installed measures (Windows and Doors n=6, Insulation n=101, Electricity Related n=163, Low Carbon Heat n=68)



Source: Steer-ED analysis of Wave 1 and 2 beneficiary survey

7.15 With solar panels, contractors only seemed to tell beneficiaries that the panels were working, with no one explaining, at either the pre-installation or installation stage, that they needed to switch to a smart export guarantee tariff to be paid for any extra electricity they produce. The respondents who experienced this were deeply frustrated at the failure to provide, what they considered to be, essential information which resulted in them not receiving any rebates for a significant time. Furthermore, some beneficiaries were not informed about the cost-effectiveness of using their appliances during the day or about the value of potentially investing in a battery for storage.

7.16 Having a crib sheet to hand to those who have had solar panels installed covering letting their energy provider know, applying for any tariff rebate, how to check the panels are working, how to benefit from the energy generated and information on servicing and maintenance will help recipients optimise the potential benefits from this measure.

7.17 There is a lack of awareness and clarity over who owns the measures and who is responsible for any ongoing maintenance or servicing. This seemingly has never been explained to households at the initial sign-up or subsequently. With regards to who is providing the maintenance package, it is of substantial importance that the supplier must be located close to the area in which the beneficiaries live. Having the supplier located miles away was no good particularly for when air source heat pumps failed to work in winter months. Householders also reported struggling to find engineers willing to service their heat pumps (or finding the costs quoted to be very large).

"I basically went a whole year and I'm like, not receiving any benefit here, my bills are absolutely astronomical, going up all the time as everybody's was last year. Why am I not seeing any benefit from my solar panels? So, I phoned up my energy provider and they were like, no we don't even do solar panel tariffs, if you want that you'd have to go to a different company, it's not automatic. I wish I'd have known that I've wasted an

entire year's worth of generating power for somebody for free and I've not been seeing any benefit from it." - 18-35, solar and loft insulation, Wakefield

7.18 Both air-sourced and hybrid heat pumps appear to have caused lots of problems. This is put down to poor quality installation, with the impression that the installers did not have the experience or knowledge to set up the system correctly. Householders reported that they do not know how to change the temperature; if they were shown they do not remember and have not been left with any simple instructions. For those with heat pumps displaying an error code householders reported that they do not know what this means or how to rectify it.

"I've had problems with the air source heat pump, I was told by Eon, who sent out one of their engineers, that it hadn't been installed properly and that it would cost £8000 for the hybrid part of the system, which I shouldn't have apparently to be taken out and for me to just have an air source heat pump system, which might work more effectively. I can't afford that, and it can't be done on the current grants so I've got a system. I can't really use it properly and I'm disappointed. I would in a heartbeat go back to my gas central heating boiler. I wish I've never embarked on the whole process" – heat pump focus group

7.19 After the installation, contractors often explain how to use and maintain the measures briefly and verbally. Many beneficiaries reported that they felt they should have been provided with written instructions. Some who were provided written instructions felt they were too technical (see Appendix I, Case Study 1). The lack of proper explanation has therefore rendered more complex measures ineffective in some cases. Several elderly beneficiaries, who had air source heat pumps installed, struggled to understand how to use them. This is supported by the survey, which found that 85% of respondents who stated they didn't understand or didn't fully understand the scheme were over 50 years old, while this demographic only accounted for 78% of the survey sample.

"He [installer] showed us the remote-control thing, and he went through it really quick, so I kept having to ring up and even now we've got a problem with it" – 51-65, air source heat pump, Stockton-on-Tees

7.20 Most respondents expected someone from the contractor company or the LA to come out and check their measures after they were installed. Whilst some did have a representative from the contracting company visit in the wake of the installation, none of the respondents recalled anyone from the LA checking how the installation process went and if the measures were working to their satisfaction.

7.21 The tone of the beneficiaries who had a representative come and check their measure suggests that they expected this to be part of the process, rather than a helpful addition to be grateful for. A regular check-in process would be especially useful for beneficiaries who did not

fully understand how to use their measures. Beneficiaries who had issues with their measure often felt 'stranded' as they believed they were left to deal with any difficulties themselves.

7.22 There were also examples of snagging issues which suggested the workmanship had not been checked properly by contractors or a representative from the local authority after the installation. Issues included: flashing not being adhered correctly, materials (e.g. excess cuttings from anti-pigeon netting for solar panels) dropping into and blocking gutters, and the use of screws that are too long to hold guttering which has caught moss and debris and caused the gutters to overflow. Beneficiaries were forced to sort these issues themselves as they could not wait for the contractors to respond.

7.23 Respondents were happy to pay for a maintenance service when it was offered by contractors, suggesting that they value ongoing professional advice. However, this service was not always offered to respondents and, even when respondents had the opportunity to pay for it, they felt that it did not meet their expectations. One beneficiary took up the offer of a solar panel maintenance package but reported that no one showed up in the 18 months they paid for it.

7.24 When asked if they had experienced any issues with condensation, damp, or mould since the installation, only a handful of respondents had (although half of those in the in-roof insulation focus group had experienced problems following having the insulation installed.) It was unclear, even for the interviewee whether these issues were caused by their newly installed measure. The low number of beneficiaries experiencing issues with damp is not necessarily an indication of no problems existing but possibly a reflection that the measures have only been in place for around a year so it may be too early to state definitively that they are not causing any problems with damp or mould.

"I've had horrendous problems now with condensation in the loft. I've got my boiler in there but there's no ventilation … I didn't even realise I had a problem because I don't go up in the loft, it's not that easily accessible for me [elderly women]. I have my boiler serviced every year and when he went up there, he said it's dripping wet through here" – insulation focus group

7.25 Those who reported in our beneficiary survey that they had issues with condensation, damp or mould before retrofit measures were installed were then asked whether this issue had improved since receiving measures. The survey found that 49% of those reporting these issues prior to measures reported an improvement post-installation, 39% stated the issues had stayed the same and 4% stated they had gotten/become worse.

Monitoring and Evaluation

7.26 Purpose of collecting information

7.27 Overall, LAs had similar ideas about what this monitoring information was used for once they were collected, recorded, and submitted to the Hub or .the Department These broadly centred around the following objectives:

- Tracking progress of schemes to ensure KPIs are being met and schemes are on track to deliver intended results;

- Facilitating or supporting argument for further funding opportunities by showing demonstrable progress and impact; and
- Ensure ability to make amendments or adjustments to schemes upon identifying potential issues, e.g., bottlenecks or capacity problems.

7.28 However, there was a sentiment that the data that LAs are being asked to collect, either through internal LA-specific mechanisms or through the Department reporting requirements, may not capture the full extent of progress or impact made by these schemes. One LA mentioned that what is currently being captured does not provide a long-term view of impact being made, and rather focuses on the short-term benefits that do not have as much of an impression on overall climate-related goals either locally or nationally.

7.29 Some respondents suggested that alternative metrics or indicators might provide more meaningful insights into scheme outcomes. For example, tracking actual energy usage or conducting more rigorous and longer-term post-installation assessments could provide more relevant and accurate information about the impact of measures on factors like property performance and occupant behaviour. Additionally, qualitative measures such as customer satisfaction and health outcomes were considered crucial factors to consider alongside quantitative data, which is currently prioritised in the current established reporting processes.

Key Learnings

7.30 Based on the findings relating to post-installation and monitoring, the following areas for improvement have been identified:

- **Communication and support:** Establishing a named point of contact throughout the entire process, including post-installation, is crucial for beneficiaries. This contact should have authority to address any problems effectively, either from the local authority or the contracting company.
- **Beneficiary aftercare:** Follow-up visits shortly after installation should be arranged through the named contact to ensure measures are working correctly and address any concerns promptly, reducing anxieties among beneficiaries.
- **Ensuring measure effectiveness:** in addition to the above, implementing return visits one month and 6-12 months after installation can ensure measures are still functioning effectively and providing the intended financial and environmental benefits. This helps ensure taxpayer money is used efficiently and households benefit as expected.
- **Clarity on maintenance requirements:** Beneficiaries need clear guidance on maintaining and servicing measures like solar panels, boilers, and heat pumps to ensure their longevity and optimal performance.
- **Subscription options for regular check-ups:** Providing beneficiaries with the choice to subscribe to a programme offering regular check-ups can enhance confidence in measure functionality. Many beneficiaries would be willing to pay for this service.
- **Access to approved local service engineers:** Providing beneficiaries with a list of approved local service engineers qualified to undertake repairs or servicing for each measure would help to ensure accessibility to reliable support when needed.
- **Providing additional information and support:** Beneficiaries could be supported with additional ideas and information on further actions they can take to reduce carbon emissions beyond the installed measures.
- **Long-term impacts:** Long-term post-installation evaluations are essential for accurately assessing the longer-term impact of measures on property performance and occupant behavior.

8 Recommendations

Introduction

8.1 This chapter draws from the findings presented in this report to provide a comprehensive set of recommendations. The recommendations are structured around the programme Theory of Change, with suggestions provided for each of the five key stages of delivery: scheme design, beneficiary targeting and engagement, delivery and installation, post-installation, and evaluation and learning. Within each section, recommendations are offered for each of the key stakeholder groups (the Department, the Hub, LAs, and the supply chain).

Scheme Design Recommendations

Recommendations for LAs

- **Utilise available resources, such as the Technical Assistance Facility, to enhance procurement processes and outcomes.** Findings suggest that LAs heavily rely on their delivery partners for schemes to go well. Other available resources should be utilised to reduce dependency on delivery partners.
- **Explore alternative delivery models beyond the contractor-led turnkey model.** All LAs in the qualitative sample opted for the contractor-led turnkey delivery model for their retrofit projects. Whilst this delivery model has its benefits (i.e. needing less capacity from the LA), there is an opportunity for LAs to understand how the option of other delivery models (such as the Managed Assessment Coordination and Evaluation Model, Local Assessment Coordination & Evaluation Model, and Managing Agreement with Contractor Design & Installation Model) could offer superior delivery arrangements.

Recommendations for the Hub

- **Support LAs with tools and resources to develop robust bids.** LAs' ability to prepare robust bids was contingent on their capacity and ability. The Hub has an opportunity to take stock of the capabilities of LAs and create a support system of tools to ensure a more even playing field regarding bid development. For instance, the Hub could distribute datasets or tools so that those who wish to develop bids in-house (as opposed to with a delivery partner) can benefit from similar capabilities.

Recommendations for the Department

- **Allow flexibility in the proposed mix of measures at the application stage** in recognition that it is difficult for LAs to have an accurate picture of eligible households before delivery commences. This flexibility has been evident in HUG 2 and should continue in future schemes.
- **Shift focus and resources from preventing beneficiary fraud to ensuring robust monitoring of supplier compliance practices**. As discussed in Chapter 4, LAs unanimously agreed that the focus on potential fraud from beneficiaries (for example through avenues such as forged documentation) is disproportionate, while the potential for supplier fraud is often overlooked and should be given greater priority.

- **Provide advance notice of deadline extensions to enable LAs to make effective operational adjustments.** Whilst the availability of extensions (to deadlines for applications as well as for delivery deadlines) was regarded as generally positive and alleviated some stressors associated with strict timelines, there was a sentiment that notice of these extensions often came too late, making it difficult to re-mobilise.
- **Coordinate schemes to avoid overlapping delivery timelines**, reducing pressure on those LAs managing multiple projects simultaneously. For example, there have been instances where scheme delivery extensions have impeded on LAs' capacity to prepare bids for upcoming retrofit schemes.
- **Allow more flexibility in time allocations for schemes facing unforeseen challenges**. As discussed in Chapter 4, where challenges regarding delivery partners and technology quality assurance guarantee and there was not enough time to procure alternative delivery partners and the schemes were discontinued by the LA.
- **Extend delivery timescales to alleviate pressure on LAs and suppliers and improve attractiveness of schemes for suppliers**. This issue was exasperated in areas where there is already as shortage of suppliers. Additionally, suppliers may also struggle to implement more technically challenging measures (e.g. external wall insulation) in such a short period of time, for it to be worthwhile for their business.
- **Regularly update funding caps in line with industry cost inflation, ensuring LAs can maintain quality and quantity of measures implemented**. Due to the recent rise in costs in the retrofit industry (i.e. for suppliers, materials and so on), the cost of implementing measures has significantly increased between earlier and more recent schemes. This means that the ability to perform the same quality and quantity of measures within houses has decreased significantly.
- **Evaluate the role of intermediaries between LAs and the Department to address potential barriers and improve communication**. As discussed in Chapter 4, experiences with intermediary groups was very mixed and it was unclear whether this is an efficient communication arrangement.
- **Ensure equitable distribution of information to all LAs to prevent disparities in knowledge and resources.** Some LAs reported circumstances where important information from DESNZ was being relayed to some LAs but not others. DESNZ should strive to ensure all LAs receive information at the same time, which prevents upholding an environment where some LAs have an advantage over others.
- **Create links with other government departments to supplement bid data and establish a centralised resource for LAs**. In order to alleviate the data challenges discussed in Chapter 4, LAs showed appetite for the Department to create links with other government departments (such as the Department for Work and Pensions) who could provide relevant, up-to-date and robust data to supplement bids.
- **Implement additional metrics alongside EPCs to better understand the impact of retrofit measures.** LAs questioned whether the EPC is an appropriate or accurate metric and reported that EPC measurements can often be subjective and open to the interpretation of the surveyor. There is therefore a rationale for implementing other types of more robust or regulated measurements to understand the true impact.
- **Work towards consistent policy and funding flows to instill confidence in the market and sustain activity.** Findings show that the 'stop-start' nature of retrofit schemes has created an environment of uncertainty for all stakeholders involved including householders, supply chain stakeholders, and LAs.
- **Develop strong branding for retrofit schemes to improve communication and engagement with stakeholders.** A current lack of brand identity has contributed towards LAs struggling to create a coherent social media strategy. Findings from the study suggest

that a focus around impacts that affect households directly (e.g. thermal comfort, monetary savings, quality of life improvements, etc.) would be most effective.

- **Align monitoring and reporting requirements with LAs' capacity and current practices, and ensure data collected is utilised effectively**. There is an opportunity to understand the data collection practices that LAs are undertaking for their own use, and how this could be aligned with the reporting that is required by the Department.

Beneficiary Targeting and Engagement Recommendations

Recommendations for LAs

- **Explore opportunities to utilise recent datasets, such as smart meter datasets for more accurate targeting.** LAs cited data issue as a key challenge faced when targeting beneficiaries. New data avenues, for example smart meter data might help to identify areas of single fuel and low usage that may indicate underheating.
- **Implement proactive long-term planning to ensure data collected is stored and utilised for future scheme use.** LAs should take a proactive approach, ensuring that data collected from home surveys conducted in previous schemes is stored for use. LAs should also look to address data gaps (off-grid households and older properties with long-standing owner-occupiers without up-to-date property information) as part of their long-term planning.
- **LAs should lead on beneficiary engagement to support scheme legitimacy.** LAs that deferred to their delivery partner for the responsibility of beneficiary engagement found that potential beneficiaries were skeptical of schemes, resulting in legitimacy concerns and under-subscription of schemes.
- **LAs should continue, or increase, their adoption of high quality in-person communication and engagement with householders to secure buy-in and trust.** It would also be valuable for LAs to share their experiences and examples of good practice with other LAs, ensuring knowledge sharing and combined LA learning.
- **Collaborate with trusted community intermediary organisations to tap into local knowledge and increase trust.** In-person engagement activities were found to be useful for building trust with residents, LAs could go further by entering into collaborations with local trusted community intermediary organisations to increase trust and tap into local knowledge.
- **LAs should continue to value, and invest in, the 'people' skills within their staff teams,** recognising the role knowledgeable and personable staff played in securing resident participation.
- **LAs could collaborate (with others and potentially the Hub) to develop or source a set of materials about different measures** so that householders can make an informed decision and know what to expect when work commences.

Recommendations for the Hub

- **Provide advice of promotional messaging.** The focus in all forms of communication appears to have centred around the financial benefits of the scheme. As well as developing guidance on consistent messaging on the potential benefits of schemes, the Hub should caution LAs around the use of financial messaging (such as bill reductions, property value and saleability). As outlined in Chapter 7, savings were often lower than expected, this strengthens the suggestion that messaging should focus on alternative metrics, such as reduced energy use and improved comfort.
- **Address disparities in data processing methods and skills amongst LAs by providing consistent resources and support**. The sophistication of data processing methods and the ability to access specialised data varied across LAs. There is an opportunity for the Hub, as

well as the Department, to help to address these disparities by sharing resources and facilitate the sharing of good practice between LAs.
- **Facilitate sharing of best practice across LAs**. Approaches to beneficiary engagement varied between LAs, and some strategies were more effective than others. The Hub can play a role in sharing best practice across LAs. The Hub could provide support for LAs on the most effective and up to date ways to engage their communities, creating communications strategies, navigating timelines for communications.

Recommendations for the Department

- **Address disparities in data processing methods and skills assistance amongst LAs** by providing resources and support for beneficiary targeting.
- **Consider resource and time requirements for LAs to undertake face-to-face community engagement.** As outlined in Chapter 5, in-person communication by LAs with residents was very effective. The Department should consider the time requirements of this type of beneficiary engagement and should build sufficient time into delivery windows to allow LAs to engage householders in meaningful ways that build trust (for example, sessions held in community halls, visiting already retrofitted homes).

Recommendations for Supply chain

- **Assist in building trust between residents and LAs to improve the beneficiary experience of retrofit delivery.** Trust between residents and suppliers is important for the process, and one way that suppliers can assist in building this trust is by being responsive to beneficiary queries during the engagement stage.

Delivery and Installation Recommendations

Recommendations for LAs

- **Provide householders with a key point of contact with the LA** even if not a named individual, they should have a clear means of contacting the relevant team and escalating concerns during and after installation.
- **Implement a clear protocol to keep householders informed of changes or delays to scheme rollout**, providing this information on publicly accessible resources and via a point of contact (householders should be provided with multiple ways to access this information).
- **Explore ways to minimise the risk taken by householders who require remedial/enabling works before retrofit measures**. This could include formal agreements about subsequent energy related works.
- **Develop a Code of Conduct / Householder Charter to hold installers to account.** This could include specific references to points raised by household such as being tidy and respectful of residents' homes.
- **Explore the feasibility of Area Based Schemes,** particularly where there are similarities in housing typology and street layout. This could allow the easier rollout of more technically challenging measures such as EWI and ASHPs. This approach would be greatly enhanced by a central database of housing stock overlaid with constraints (see previous recommendation for a Data Coordination role for the Hub).

Recommendations for the Hub

- **Utilise the procurement/ development of Local Area Energy Plans (LAEPs)[18], such as for the TVCA area[19], to coordinate data and identify suitable properties for retrofit programmes**. The Hub could use data collated as part of a LAEP to develop a geospatial map of housing stock, with layers that identify particular properties and areas suitable for public retrofitting programmes (heat or fabric). Such an approach would enable LAs and partner suppliers to develop a more accurate view of opportunities in an area at bidding stage, but also allow suppliers to quickly identify any potential planning issues during the early stage of delivery.
- **Address low sentiment towards training in the retrofit sector, particularly among SMEs.** Consider initiatives such as a voluntary charter for vocational standards to encourage signatories and increase skills development. LAs tend to work with large national companies due to the scale of retrofit programmes, but working with local SMEs could have a significant impact on regional economic growth and local skills development. Several initiatives could be considered to increase the diversity of the local supply chain:
  - **A voluntary charter for vocational standards**: One consultee suggested that the absence of vocational standards often means the vast majority of the sector are not well trained. To address this, there is an opportunity for the Hubs to consider the development of a 'coalition of the willing' and encourage their existing supplier network to sign up to a voluntary charter for enhanced vocational standards. The public sector could leverage its buying power to encourage signatories, and if there was funding to trial it, the lessons learned could inform future policy. Other countries have a broader range of stakeholders informing skills policy rather than just industry, and this is something that could be replicated in the UK (where skills policy tends to be industry-led) on a small-scale, trialed and scaled up.
  - **Encouraging turnkey suppliers to increase their local SME supply chain**: Whilst turnkey suppliers often have established supply chains in the regions they work, the Hub could consider the ways in which they might support increasing diversity in supply chains by, for example:
    - Applying social value requirements within procurement;
    - Expanding their existing supply chain work;
    - Exploring collaborations with Combined Authorities programmes; and
    - Opportunities to join up other Hub studies, such as the Domestic Retrofit Skills Need Assessment recently commissioned.

Recommendations for the Department

- **Implement processes for knowledge transfer to avoid fragmented communication** caused by staff turnover.

[18] LAEPs are a data-driven and whole energy system, evidence-based approach that aim to identify the most cost-effective route for a local area to meet national and local net zero targets, whilst informing energy network investment and planning. Retrofitting is considered a central part of LAEP development with regards to demand management.

[19] We are aware that the Hub/ TVCA may be procuring a LAEP soon for the TVCA area.

- **Ensure funding covers survey work to address the lack of high-quality data on housing stock.** Consider collating and pooling data across programmes to enhance intelligence on housing stock characteristics.
- **Consider mechanisms to streamline planning requirements around ASHPs[20] and EWI to minimise delivery delays.** This could include support for geospatial mapping of housing stock to identify planning challenges early on. Additionally, delivery timescales could be increased to allow for delays due to planning applications.
- **Encourage the RMI sector to engage with PAS2035**. Currently there is no requirement for PAS2035 to be adopted within the private / able-to-pay market. If the government provided a requirement for all retrofit works to adhere to PAS2035 (for example through Building Regulations), this would incentivise the RMI sector to invest in training, and also open up their skills to the public sector market.
- **Roll out of a PAS2035 'Lite'**. Trustmark are already discussing the development of a new standard called 'Licence Plus' aimed at all trades. This was described as a 'PAS2035 lite'. They argued this would be a practical way to ensure all retrofitting outside public sector programmes was done to a good standard and encourage investment in training and skill development within the RMI/SME sector.
- **Address challenges with PAS2035, such as interpretation issues, increased cost burden, and shortcomings in meeting quality standards.** Consider streamlining administrative tasks and focusing on on-site quality assurance within the Standard itself.

Post-installation Recommendations

Recommendations for LAs

- **Verify EPCs** to ensure properties are eligible for retrofit measures. One LA consulted implemented a process before approving proposed installations which enabled them to compare EPCs to the PAS035 assessment conducted by the installer. Whilst this process was not a requirement, it demonstrates best practice, as it was crucial in detecting discrepancies between the EPC and the PAS2035 assessments.
- **Consider training in-house LA officials in retrofit roles or employing an independent retrofit coordinator and/or assessor** to avoid suppliers 'marking their own homework' and so that LAs can feel confident that PAS2035 standards are being complied with.
- **Require contractors to use templates for handover documents and activities**. LAs could collaborate with the Hub or with other LAs to create these. Whilst the Hub could play a coordination role, LAs could ensure this was a contractual requirement so that materials shared by suppliers were fit-for-purpose and had been piloted with a representative cohort to ensure accessibility of materials. Suppliers also indicated they would welcome such an approach to avoid 'reinventing the wheel' for each programme.
- **LAs should consider whether procurement needs to be more prescriptive about activities such as handover.** For example:
  - Minimum expectations around user manuals, particularly in relation to solar panels. For example, a crib sheet to hand to those who have had solar panels installed which includes a covering letting their energy provider know, applying for any tariff rebate,

[20] We are aware that the Department has recently completed a review of ASHP and recommended removing the one-meter rule (ASHP should not generate a noise above 42 decibels within one metre of a neighbour's door or window) particular requirement, potentially reducing potential issues going forward.

how to check the panels are working, how to benefit from the energy generated and information on servicing and maintenance will help recipients optimise the potential benefits from this measure. This should go beyond the PAS2035 wording which states that user manuals should be provided 'whenever possible.'

- Requiring suppliers to provide contact details for whom to contact during the 'defects' period (or equivalent), and embedding a requirement that concerns be addressed within a reasonable timeframe. Beneficiaries regularly stated that the lack of a named contact for aftercare was a source of frustration, with some waiting for up to 18 months for a 'snag' to be rectified.
- LAs should provide information early on about ownership of measures once work is complete, as well as responsibilities for maintenance and servicing where applicable. Whilst beneficiaries were often willing to pay for ongoing maintenance, this option was not always offered. LAs should consider ensuring suppliers have a package that can be offered to beneficiaries. Where maintenance service packages are offered, LAs should ensure that the supplier is located close to the area within which the beneficiaries live to ensure timely responses. LAs should also consider regular quality reviews. Beneficiary fieldwork suggests that the quality of services was not always consistent, with some beneficiaries having to wait over 18 months for remedial action to be taken from a paid-for maintenance package.

Recommendations for the Hub

- **Explore the role the Hub could play in leveraging earlier involvement of District Network Operators** in programmes where there is likely to be significant electrification of heat or addition of generation capacity.
- **Explore the potential for a Hub-led programme looking at the performance and optimisation of heat pumps**, with the objective of improving householder experience and access to wider benefits that these technologies offer (such as flexibility payments).

Recommendations for the Department

- **Consider whether the timing of quality assurance processes in current standards take are appropriate**, given that there can be a significant lag between handover and when issues can arise (i.e., condensation, mould growth).
- **Consider whether the suggested 3-month post installation evaluation, as outlined in PAS2035 is appropriate** for capturing householders' true experiences of aftercare and their post-installation experience. As highlighted in the findings of this report, many issues arose after a longer period of time.
- **Consideration of the role of an 'air-tightness champion'** may help to reduce the post completion issues arising in the first place. Whilst the Retrofit Coordinator role is intended to cover this role, this does require specialist skills, and regular onsite presence to check work as it is being installed, propose remedial action, or offer toolbox talks to upskill the installers.
- **Consider whether householder accessibility needs are sufficiently captured in existing standards** (e.g. accessible controls and switch locations).

Recommendations for Supply chain

- **Take an active role in aftercare**. Beneficiaries reported considerable frustration with the lack of aftercare, and timeliness of addressing snags. Beneficiaries regularly stated that

remedial action relating to snags or poor workmanship were not prioritised or in some cases dealt with at all.

- **Recognise that householders are not one homogenous group**, and that householder may require different types of support in terms of accessibility and format. Some beneficiaries struggled with using ASHPs or solar panels correctly and would benefit from additional and more accessible guidance. A range of formats should be provided to ensure that all accessible requirements are met.
- **Consistently offer maintenance service packages**. Suppliers should consider consistently offering paid-for maintenance service packages. But they should ensure that these are regularly quality assured (i.e., ensure requests are dealt with in a timely manner). Fieldwork with beneficiaries implies that many were happy to pay for the service, but there were frequent reports that the service was poor.

Evaluation and Learning Recommendations

Recommendations for LAs

- **Share well-established processes and evidence of good practice with other LAs** through coordination with the Hub. Sharing of learning around areas such as vetting procedures for delivery partners, how to manage householder expectations, conducting checks or audits of supplier compliance with standards such as PAS2035 and good examples of handover materials to residents would be particularly beneficial, as highlighted by the findings in this report.
- **Explore opportunities to track outputs and outcomes of interest such as actual energy use**, to allow for better evaluation of impact of retrofit schemes.

Recommendations for the Hub

- **Foster collaborations between LAs within geographic proximity to share best practices and local intelligence**, focusing on issues such as vetting and procurement of delivery partners.
- **Work with the Department to coordinate and host engagement guides and templates for LAs,** such as conversation guides for canvassers and consistent messaging about measures and programme objectives.
- **Continue facilitating informal support and meet-ups between LAs to cultivate peer learning and support.**

Recommendations for the Department

- **Provide templates and guidance, including privacy notices, to facilitate comprehensive evaluation**. This would address challenges around access to suitable beneficiary and supply chain contacts for evaluation points.
- **Consider how template documents e.g consistent messaging in promotional material, and best practice guides could be developed and hosted for easy access by LAs and delivery partners** - either via the Hubs or a centralised resource like the Technical Assistance Facility.

Recommendations for Supply chain

- **Be open to engaging with partners on monitoring and evaluation practices** as these activities can generate learning that benefits installation practices and technology development.

Appendices

A Evaluation Key Questions and Sub Questions

	#	Key Question	Sub-Questions
Beneficiary journey	1	What was the beneficiary experience of the engagement stage?	• What communications were received, and from who? • Did the customer feel well informed about the scheme and the potential benefits of the retrofit measures? • What were the relationships between LA/3rd party providers and the installers? • What worked well and what worked less well, and how could the beneficiary engagement stage of the retrofit process be improved?
	2	What was the beneficiary experience of the installation of measures?	• Did beneficiaries feel enabled to make an informed choice of measures? • Would the beneficiary recommend the provider (i.e., LA), the installer, and the measures? • What worked well and what worked less well, and how could the installation stage of the retrofit process be improved?
	3	What has been the beneficiary experience of living with the measures installed?	• How have the measures installed made a difference to beneficiaries? For example., thermal comfort, energy bills, health? • Have the installed measures resulted in behaviour change? For example., lifestyle, energy use (was there a rebound effect?) • What handover information and aftercare were received and did this support beneficiaries to use the technologies and live with the measures installed? • Have there been any issues with the installations and how have these been resolved? • What worked well and what worked less well, and how could the post-installation stage of the retrofit process be improved? •
Strategic	1	What was the approach to tendering, bid writing and procurement of suppliers?	• What resources (both resources that were pre-existing and those that were later acquired) were available and were these resources sufficient? • What was the experience of communication and engagement between the LA/HA and BEIS/the Hub during these stages? • Did the organisation have access to the required stock data? • If not, what impact did this have? • How was this resolved? • What processes have since been put in place to mitigate against issues and risks encountered? • What were the most significant challenges in producing a successful bid?

			• Did they use the same partners/installers for the whole programme? If multiple were used, why? • Did they have the necessary connections to suppliers to deliver the level of activities needed? • What worked well and worked less well, and how could these stages of the retrofit process be improved?
	2	What was the approach to beneficiary engagement?	• What data was used to effectively target beneficiaries who are low-income and live in EPC-rated domestic dwellings? • What was done to promote the scheme? • Was engagement with beneficiaries/promotion of the scheme effective to meet KPIs? • What would have supported LAs to reach KPIs?
	3	What was the delivery approach adopted by strategic delivery stakeholders? i.e., in-house or managing agent or a combination?	• What Fraud mitigation tactics were used and were they effective? • What aftercare was provided to beneficiaries (if any) and what were the barriers and enablers to delivering adequate aftercare? • What governance process was in place? • What was the experience of communication and engagement between the LA/HA and BEIS/the Hub during these stages? • What worked well and what worked less well about the delivery approach? • What are the barriers and enablers of successful delivery of measures that were PAS2035/TrustMark compliant? • How could the delivery stage be improved?
	4	Would the organisation undertake the same retrofit programme again?	• What were the benefits to the being involved? • What were the drawbacks to being involved (for example. were there any unexpected costs?)? • What changes have been made to be able to mobilise better for future programmes?
	5	What monitoring and evaluation activity was undertaken?	• What was the quality and completeness of monitoring information? • How was this information used?
Supply chain journey	1	What was the supply chain experience of the design and installation stages?	• What worked well and less well? i.e., access, resident attitudes, materials availability, staff skills and capacity, cost, etc., and how could these stages be improved? • What effect does changing delivery parameters have on delivery performance (guidance changes, extension, criteria, cost and EPC caps, etc.)?
	2	What was the supply chain's understanding of PAS/TrustMark standards?	• Did the organisation have a good understanding of PAS/TrustMark compliant measures using the existing skills, certification, capacity and knowledge within the organisation? • If not, what additional skills/certification/ knowledge/capacity was needed? • What are the barriers and enablers to achieving the capacity/ skills/certification required to be involved in the delivery of government retrofit funds? • Did the organisation have the capacity to deliver PAS/TrustMark compliant measures? • What were the main barriers and enablers to the successful delivery of PAS-compliant installations? •

	3	What advice and aftercare were the organisation contracted to deliver?	• Was this perceived to be helpful for beneficiaries?
Legacy	1	What opportunities exist for the Hub to create and add value within the provision of support for housing retrofit, both in terms of providers and the supply chain?	• How might the Hub best allocate and target its resources to remove barriers and enhance enablers towards successful delivery?
	2	What are the main recommendations to be fed back to Government?	• What does a successful retrofit scheme look like? • What are the key challenges for stakeholders? • What are the most significant lessons learned? • What additional support is needed for beneficiaries, supply chain and strategic delivery stakeholders? •

Source: Steer-ED, 2023

B Literature Review List

Document Title	Year	Type
Health effects of home energy efficiency interventions in England: a modelling study	2017	Research
Domestic retrofit: understanding capabilities of micro-enterprise building practitioners	2021	Research
The time dimension in deep renovation: evidence and analysis from across the EU	2019	Research
Unseen influence – The role of low-carbon retrofit advisers and installers in the adoption and use of domestic energy technology	2014	Evaluation
Evaluating energy and carbon performance in the 'Retrofit for the Future' demonstrator projects	2009	Evaluation
Deep low-carbon refurbishment challenge: what hasn't worked as designed?	2015	Research
A co-evolutionary approach to understanding construction industry innovation in renovation practices for low-carbon outcomes	2018	Research
Anatomy of low-carbon retrofits: evidence from owner-occupied super homes	2014	Research
Deep retrofit approaches: managing risks to minimise the energy performance gap	2019	Research
Domestic retrofit supply chain initiatives and business innovations: an international review	2021	Research
Domestic UK retrofit challenge: Barriers, incentives and current performance leading into the Green Deal	2012	Research
Dartford Housing Retrofit Project, Evaluation Report	2017	Evaluation
Exploring the practices and roles of UK construction manufacturers and merchants in relation to housing energy retrofit	2020	Research
Exploring the time dimension of low-carbon retrofit: owner-occupied housing	2013	Research
Housing retrofit: six types of local authority energy service models	2021	Research
Installer Power	2015	Research
Intent and outcomes from the Retrofit for the Future programme: key lessons	2015	Research
Learning from 'horror' stories: a plan of work to reduce the performance gap in deep retrofit	2017	Research
Residential retrofit in the climate emergency: the role of metrics	2020	Research
Retrofit at scale: accelerating capabilities for domestic building stocks	2021	Research
Retrofitting existing housing: how far, how much?	2013	Research

C CATI Sample

Variable	Category	Total pop (n= 4432)	Wave 1			Wave 2		
			Target (n= 150)	Actual (n=150)	Variance	Target (n=250)	Actual (n=264)	Variance
Measure Group	Insulation	32%	47	40	-7	80	82	+2
	Low-Carbon Heat	19%	29	32	+3	48	52	+4
	Heating Control	0%	0	0	0	0	0	0
	Windows & Doors	2%	4	6	+2	6	5	-1
	Electricity Related	47%	70	72	+2	116	125	+9
Geographical region	Calderdale	3%	5	7	+2	8	23	+15
	City of Bradford	4%	6	9	-+3	9	22	+13
	City of York	1%	2	4	-+2	2	7	+5
	Darlington	8%	11	13	+2	19	13	-6
	Doncaster	0%	1	1	0	2	1	-1
	Hambleton	3%	5	6	+1	7	6	-1
	Hartlepool	6%	10	13	+3	16	11	-5
	Leeds City	7%	10	10	0	17	17	0
	Redcar and C'land	14%	21	13	-8	35	34	-1
	Richmondshire	3%	4	4	0	7	10	+3
	Ryedale	3%	4	8	+4	7	7	0
	Scarborough	4%	6	7	+1	10	12	+2
	Sheffield	24%	36	27	-9	61	29	-32
	Stockton-on-Tees	12%	18	12	-6	31	28	+3
	Sunderland	5%	7	9	+2	12	30	+18
	Wakefield	3%	4	7	+3	7	14	+7
Property Tenure	Owner Occupied	96%	144	141	-3	240	253	+13
	Private Rented	1%	1	0	-1	2	1	-1
	Social	3%	5	9	+4	8	10	+2

D CATI Questions

Introduction

Steer-ED has been commissioned by the North East and Yorkshire Net Zero Hub to conduct an evaluation of housing retrofit activity in the North East and Yorkshire region. The purpose of the evaluation is to understand what went well and to identify opportunities to improve the delivery of future housing retrofit programmes.

As part of the evaluation, we are interested in understanding the experiences and perceptions of residents who have been supported by the retrofit programmes. These insights are really important in informing the design and delivery of future initiatives. We understand that you were interested in (but did not go ahead with) or have received free home energy measures from your Local authority under the LAD2 programme and we would like to ask you some questions about your experiences. The questions should take no longer than 20 minutes.

The answers that you give will be used to produce a report which will summarise our findings and present key recommendations for similar programmes. The report will be shared with the North East and Yorkshire Net Zero Hub and central government (DESNZ) and may also be published. Please note that all responses will remain confidential, and any comments will not be attributable to a named individual.

8.2 We are asking participants for consent to record the interviews. These will solely be used for analysis and note-taking purposes and will be deleted within three months of project closure. Any recordings will not be shared beyond the project team. Do you agree for this interview to be recorded?

Basic Information

To be completed using the contact database spreadsheet prior to interview (all information should be available). If data is incomplete, please confirm missing details with participant at start of call

Unique Property Reference Number	
Property Tenure (Owner Occupied/Private Rented/ Social Housing)	
Measure Group (s) *see table at end of document for answer options	
Measure Type (s) *see table at end of document for answer options	
Local Authority	
Installation Start Date (dd/mm/yy)	

Installation Completion Date (dd/mm/yy)	
Did they receive free home energy installation measures from the council (yes/no) **NB: If the participant did not end up taking part in the scheme please ask questions in sections 1, 2 and 3**	
Has the respondent taken part in wave 1 of the survey (Yes/No) **NB: This is for internal use only. For follow up surveys, only ask questions in section 4 and 5**	

Section 1: About the beneficiary

#	Question	Answer Options
1	**How long have you been living in your current home where the retrofit installations took place?**	(1) Less than 1 year (2) Between 1 and 2 years (3) Between 2 and 5 years (4) Between 5 and 10 years (5) More than 10 years
2	**What is your age?**	(1) 18-35 years (2) 36-50 years (3) 51-65 years (4) 66+ years (5) Prefer not to say
3	**What gender do you identify as?**	(1) Male (2) Female (3) Non-binary (4) Other (5) Prefer not to answer

Section 2: About the Property and Household

#	Question	Answer Options
4	**What type of property is the building that received retrofit measures?** *Notes: A house at the end of a terrace must be coded 'terrace' even if there are only three houses in the terrace. Houses which are joined only by a garage (link-detached) should be coded detached*[21]	(1) Detached (2) Semi-detached (3) Terrace (including end-terrace) (4) Bungalow (5) A self-contained flat, maisonette or apartment

[21] English Housing Survey Questions & Coding

		(6) Room/ rooms (e.g., bedsit or flatlet with shared kitchen/bathroom) (7) Other
5	**To the closest decade, what year your property was built?**	(1) X year (2) Don't know
5a	**If you do not know what year your property was built, do any of these characteristics apply to your residence (select all that apply)?**	(1) "New-build" (built in last 20 years) (2) Victorian property (pre 1900) (3) Has or has previously had asbestos (4) Has cavity walls (5) Other – please specify (6) Don't know
6	**Which of the following best describes your household?** *Notes: Please clarify with respondent if the way the property is occupied is not clear.*	(7) One-person household - one person only (8) Couple (the INTERVIEWEE and their partner/spouse/cohabitee are the only occupants) (9) Family (one household composed mainly of people who are related to either the INTERVIEWEE or their partner/spouse/cohabitee, including extended families; includes individuals or couples with non-paying guests, carers and au pairs) (10) Joint owners, some unrelated (i.e., some of the mortgage sharers or joint owners are unrelated) (11) Household with lodger(s)/boarder(s) paying rent who are PART of the household (12) Household with lodger(s) paying rent who are NOT part of the household

		*(13)*Tenants sharing, some unrelated (e.g., one or more of the joint tenants are unrelate*d to both the INTERVIEWEE and their partner/spouse/cohabitee)*
7	**How many adults (people aged 18 and over) live in the household?**	X number
8	**How many children (people aged below 18) live in the household?**	X number

Section 3: Experience of engagement stage

#	Question	Answer Options
9	**How did you hear about the LAD2 retrofit scheme? (Where did the first contact come from?)** **Unprompted initially – prompt if needed**	(1) Installer company advert on social media (2) Leaflet or flyer from the installer company (3) Local Authority advert on social media (4) Email or letter from the Local Authority (5) Leaflet or flyer from the Local Authority (6) Central government communications or website (7) From family or a friend (8) Can't remember (9) Other – please specify
10	**What were your initial thoughts about the retrofit scheme after hearing about it for the first time?**	(1) Interested (2) Not interested (3) Was not sure if the scheme was legitimate/ Did not trust the scheme (4) Can't remember (5) Other – please specify
11	**After receiving more information about the retrofit scheme, e.g. after enquiring to your local authority, to what extent did you feel that you understood the scheme and how it would work? Please rate your understanding from 1-5, with 1 being 'I didn't understand at all' and 5 being 'I fully understood'**	(1) I didn't understand at all (2) I didn't understand (3) Neutral (4) I mostly understood (5) I fully understood (6) Can't remember

11a	**What was the main reason that you did not fully understand the scheme and how it would work?** **Unprompted initially – prompt if needed** *Note: Only ask if participant answered response (2) or (3) to question 11*	(1) It was not clearly explained (2) There was a lack of information available (3) The scheme is complicated (4) I had not looked into the scheme/done any research (5) Other – please specify
12	**From a scale of 1-5, with 1 being 'Very uninformed' and 5 being 'Very informed', to what extent did you feel informed of the benefits of taking part in the scheme?**	(1) Very uninformed (2) Quite uninformed (3) Neither informed or uninformed (4) Quite informed (5) Very informed
13	**What were your main 3 reasons for pursuing the retrofit activity?** **Unprompted initially – prompt if needed**	(1) Imposed by landlord (2) Measures free of charge (3) Reduced energy use (4) Reduced energy bills (5) Improved warmth / thermal comfort (6) Better indoor air quality (7) Reduce damp/mould (8) Lower carbon emissions (9) To become an eco-home (10) Improve property value (11) Other – please specify
14	**If you did not end up taking part in the scheme, what was the main reason for this?** **Unprompted initially – prompt if needed** *Note: Only ask if participant did not end up taking part in retrofit activity*	(1) I didn't want disruption to my home (2) I didn't have time (3) The scheme did not seem trustworthy (4) I didn't think the measures would work as expected (5) My neighbours/ friends had bad experiences (6) My home was classed as hard to retrofit (7) Other – please specify

Section 4: Experience of installation

#	Question	Answer Options
15	**To what extent did you have a choice about which measures were installed?**	(1) It was completely my choice (2) It was mostly my choice (3) It was partly my choice (4) It wasn't my choice at all

		(5)	Don't know
15a	**Which measures were you offered?** **Unprompted initially – prompt if needed** **Notes: Only ask if participant answered (1) or (2) to question 15**	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30)	Insulation Cavity Wall Insulation External Solid Wall Insulation Internal Solid Wall Insulation Loft Insulation Pitched Roof Insulation Flat Roof Insulation Room in Roof Insulation Floor Insulation Park Home Insulation Low Carbon Heat Air Source Heat Pump Ground Source Heat Pump Hybrid Heat Pump Biomass Boiler Solar Thermal Electric Storage Heating Heating Controls Hot Water Tank Insulation Hot Water Tank Thermostats Windows and Doors Double or Triple Glazing Draught Proofing Energy Efficient Windows and Doors Secondary Glazing Electricity Related Solar PV Energy Efficient Lighting None of these Other
15b	**Who discussed the option for measures to be installed with you?** *Notes: Only ask if participant answered (1) or (2) to question 15.*	(1) (2) (3) (4) (5)	Local Authority representative Retrofit Coordinator Retrofit installer Other Don't know
15c	**Do you feel that you had all the information you needed to make an informed choice?** *Notes: Only ask if participant answered (1) or (2) to question 15.*	(1) (2) (3) (4)	I was able to make an informed choice I was able to make neither an uninformed or informed choice I was not able to make an informed choice Not applicable - measures were decided at application stage and I did not have a choice

15d	Why do you feel that way? *Notes: Only ask if participant answered (1) or (2) to question 17, and has answered 15c.*	Open Response
16	**On a scale of 1-5, with 1 being 'Very poor' and 5 being 'Excellent', how would you describe your experience with the installer based on the following characteristics?** **(1 = very poor, 2 = poor, 3 = neutral, 4 = good, 5 = excellent)**	(1) Communication throughout span of installation (2) Politeness and curtesy throughout span of installation (3) Cleanliness at the end of each day of work (4) Cleanliness after completion of installation (5) Timekeeping – e.g. turning up on time (6) Reliability
17	**Over what time period were the major elements of your retrofit carried out (not including maintenance work or minor improvements)?**	(1) Less than 6 months (1) 6 months – 12 months (2) 13 – 24 months (3) More than two years (4) Don't know
18	**With regard to the measures that have been installed, to what extent would you recommend from a scale of 1-5, with 1 being 'Wouldn't recommend at all' and 5 being 'Strongly recommend';** • **Your Local Authority who supported and delivered the scheme?** • **The installer?** • **The measures installed?**	(1) Wouldn't recommend at all (2) Wouldn't recommend (3) Neutral (4) Recommend (5) Strongly recommend (6) Don't know
19	**Overall, from a scale of 1-5 with 1 being 'Very poor' and 5 being 'Excellent', how would you rate your experience of the installation process?**	(1) Very Poor (2) Poor (3) Neutral (4) Very Good (5) Excellent

Section 5: Living with Retrofit Measures

#	Question	Answer Options
20	**Did you have any issues with condensation, damp or mould before retrofit measures were installed?**	(1) Yes (2) No (3) Don't know

21	**After these you had measures installed, did these issues...**	(1) Stay the same (2) Get better (3) Get worse (4) Don't know
21a	**If issues have gotten worse, why do you think this is? (Select all that apply)**	(1) Lack of ventilation due to installed measures (e.g. PVC windows, double glazing, insulation) (2) Lack of ventilation for other reasons (3) Lack of use of ventilation fans and opening of doors/windows (4) Drying clothes inside the property (5) More water ingress (6) More rain and moist weather (7) Colder weather (8) Decreased use of heating (9) Don't know (10) Other (please specify)
21b	**If issues have gotten better, why do you think this is? (Select all that apply)**	(1) Improved ventilation due to measures installed (2) Improved ventilation because of other reasons (3) Less water ingress/fixed leaks (4) Less rain and moist weather (5) Warmer weather (6) Increased use of heating (7) Don't know (8) Other (please specify)
21c	**If you had issues before, and they have stayed the same would you have expected them to improve because of measures installed?**	(1) Yes (2) No, the installed measures were not relevant to condensation, damp or mould (3) Don't know
22	**In terms of temperature, before the retrofit measures were installed in your home, how would you describe typical conditions in** **winter? Please rate this on a scale of 1-5, with 1 being 'Very cold' and 5 being 'Very hot'.**	(1) Very cold (2) Cold (3) Comfortable (4) Warm (5) Very warm (6) Other/Don't know
23	**In terms of temperature, after retrofit measures were installed in your home, how would you**	(1) Very cold (2) Cold (3) Comfortable

	describe typical conditions in winter?	(4) Warm (5) Very warm (6) Other/Don't know
24	**Since receiving retrofit measures has your energy usage…**	(1) Decreased (2) Stayed the same (3) Increased (4) Don't know
25	**Since receiving retrofit measures has your energy bill…**	(1) Decreased (2) Stayed the same (3) Increased (4) Don't know
26	**Do you feel you received adequate support or aftercare (support that is needed post-installation, e.g., due to maintenance or functional issues) after installation of measures**	(1) Yes (2) No (3) I didn't need any aftercare
27	**Did you experience any benefits in living with the installed measures?**	(1) Reduced energy use (2) Reduced energy bills (3) Improved warmth / thermal comfort (4) Improved indoor air quality (5) Reduced damp/mould (6) Lowered carbon emissions (7) Became an eco-home (8) Improved property value (9) Other – please specify (10) Don't know
28	**Did you experience any negatives in living with the installed measures?**	Open response
29	**Overall, how satisfied are you with your installed measured measures? Please rate this on a scale of 1-5, where 1 is 'Very dissatisfied' and 5 is 'Very satisfied'.**	(1) Very Dissatisfied (2) Quite Dissatisfied (3) Neither satisfied or dissatisfied (4) Quite satisfied (5) Very satisfied (6) Don't know

Section 6: Follow up

#	Question	Answer Options
30	**Would you be happy to take part in a short follow up survey? Upon completion of the follow up survey you will receive £20** *Notes: Do not ask this question if this is a follow up survey*	(1) Yes (2) No
31	**Would you be happy to take part in an interview or focus group? If you take part in an interview or a focus group you will receive £50**	(1) Yes (2) No

Measure Group and Measure Type Key

Measure Group	Measure Types
Insulation	Insulation Cavity Wall Insulation External Solid Wall Insulation Internal Solid Wall Insulation Loft Insulation Pitched Roof Insulation Flat Roof Insulation Room in Roof Insulation Floor Insulation Park Home Insulation
Low Carbon Heat	Low Carbon Heat Air Source Heat Pump Ground Source Heat Pump Hybrid Heat Pump Biomass Boiler Solar Thermal Electric Storage Heating
Heating Control	Heating Controls Hot Water Tank Insulation Hot Water Tank Thermostats
Windows and Doors	Windows and Doors Double or Triple Glazing Draught Proofing Energy Efficient Windows and Doors Secondary Glazing
Electricity Related	Electricity Related Solar PV Energy Efficient Lighting

E Beneficiary Interview and Focus Group Sample

E.1 The spread of respondent types involved in the qualitative depth interviews including the in-home visits is shown in the tables below:

Measures	# of depths
Insulation	17
Low-Carbon Heat	12
Windows and Doors	1
Electricity Related	20
Total	**50**

Property	# of depths
Owner Occupied	47
Social	3
Total	**50**

Lifestage / Age	# of depths
Early adulthood (ages 21-35)	9
Middle adulthood (ages 36-50)	10
Late adulthood (ages 51-65)	17
Eldership (ages 66+)	14
Total	**50**

Rating of experience – rating installation process	# of depths
Excellent	12
Very good	11
Neutral	10
Poor	4
Very poor	13
Total	**50**

LA	# of depths
Calderdale	7
City of Bradford	4
City of York	2
Darlington	2
Doncaster	1
Hambleton	4
Hartlepool	3
Leeds City	2
Redcar and Cleveland	6
Richmondshire	1
Ryedale	3
Scarborough	1
Sheffield	5
Stockton-on-Tees	3
Sunderland	2
Wakefield	3
Total	**50**

E.2 The focus groups comprised 5-6 respondents per session:

Group 1 – all had insulation measures retrofitted

- Mix of local authority areas
- Mix of ages and gender
- Mix of those who rated the experience positively, neutral and negatively

Group 2 – all had low carbon heat measures retrofitted

- Mix of local authority areas
- Mix of ages and gender
- Mix of those who rated the experience positively, neutral and negatively

Group 3 – all had solar PV retrofitted

- Mix of local authority areas
- Mix of ages and gender
- Mix of those who rated the experience positively, neutral and negatively

Group 4 – all had solar PV retrofitted

- Mix of local authority areas
- Mix of ages and gender
- Mix of those who rated the experience positively, neutral and negatively

F Beneficiary Journey Map

Dissemination of Information
Communication between key stakeholders about the impact of retrofit, and how this may apply to beneficiary's situation. Advice is given to a landlord or resident client by a qualified retrofit advisor, including information about the process, the evaluation improvement options, the selection of efficiency improvement measures, the retrofit design, the operation & maintenance of installed measures, or how to operate a home in an energy efficient way, after retrofit
Stakeholders involved:
Funder Client; Landlord Client; Resident Client; Retrofit Advisor

Building and Energy Assessment
Undertaken by the retrofit assessor and assesses the characteristics of an existing dwelling, including local contract, built form, construction, services, condition and energy efficiency, and occupancy, to provide information for the preparation of a retrofit design. Key purpose is to understand the case for retrofitting the property
Stakeholders involved:
Landlord Client; Resident Client; Retrofit Coordinator; and Retrofit Assessor

Installation
Location, placement and/or fixing of an energy efficiency measure in, or connected to, an existing building excluding any related work to enable the installation of the measure
Stakeholders involved:
Landlord Client; Resident Client; Retrofit Coordinator; Installer

Beneficiary Buy-in
Buy-in of beneficiary (social landlord/private landlord/homeowners) usually motivated by a prompt or series of motivations, e.g., tenants identifying damp or insulation issues, or moving property etc. Resulting from identification of households most likely to require support
Stakeholders involved:
Landlord Client; Resident Client

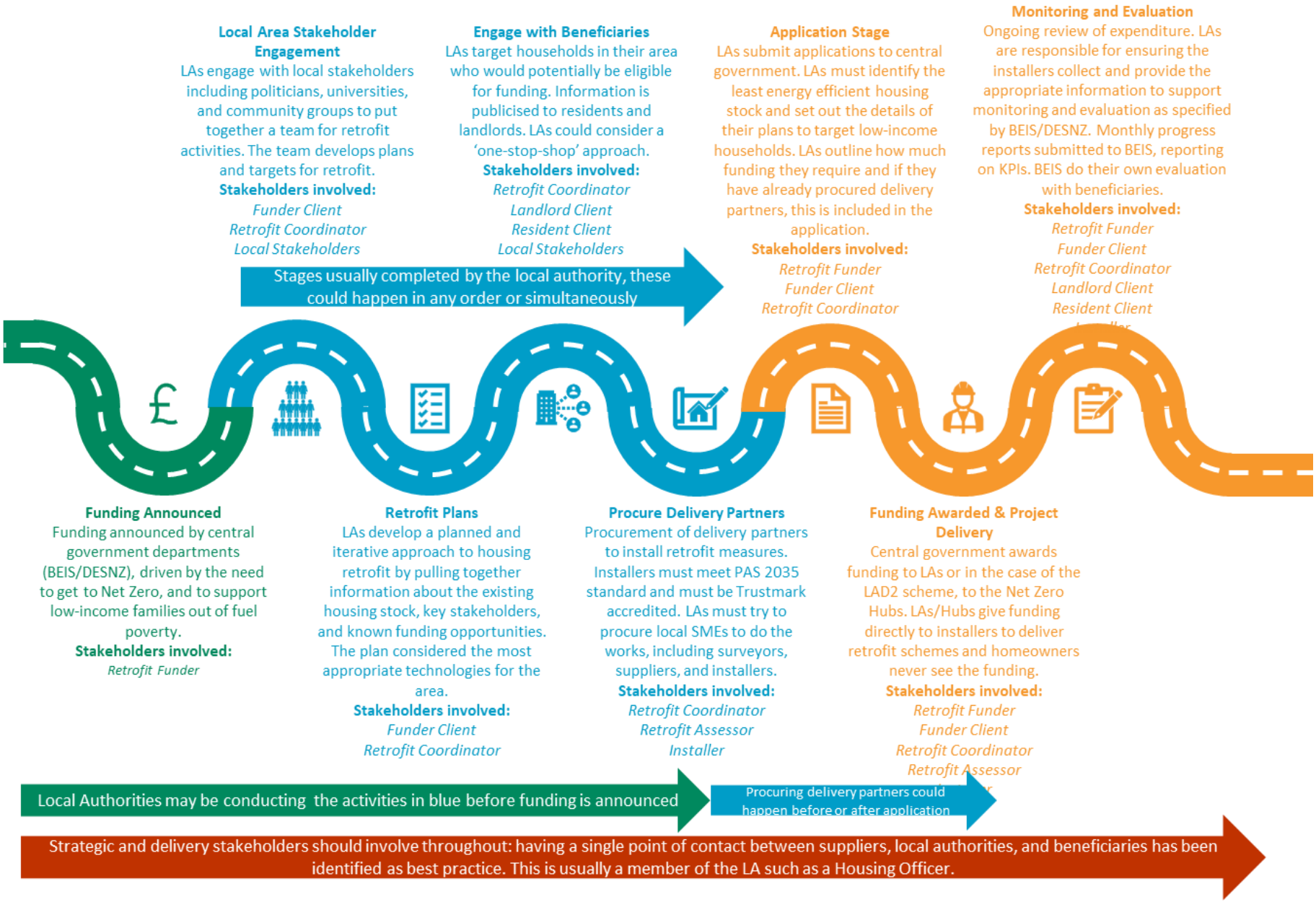
Awards Process
Eligible homeowners could get up to £10,000 for the funding of home energy efficient measures. Private or social housing landlords with eligible tenants can also apply to get up to £5,000 towards the cost of the same Energy Efficient Measures improvements, however landlords may be required to contribute at least a third of the cost. This means landlords can receive up to £7,500 worth of measures installed for a maximum contribution of £2,500. Landlords may agree to additional works with the project manager at their own expense
Stakeholders involved:
Funder Client; Landlord Client; Resident Client

Agreement of Installation Measures
All stakeholders to be in agreement of activities to take place
Stakeholders involved:
Landlord Client; Resident Client; Retrofit Coordinator; Retrofit Advisor; and Retrofit Assessor

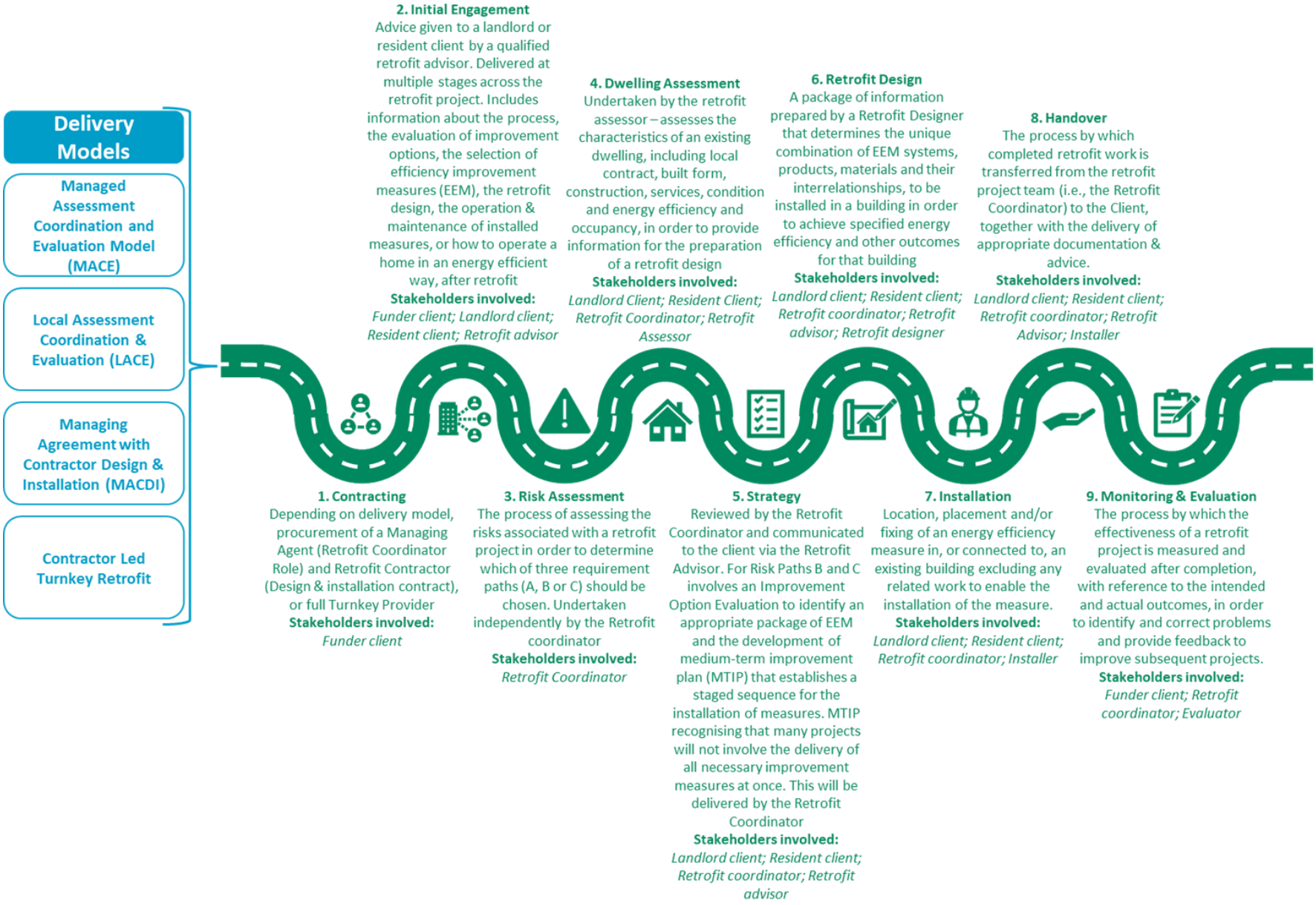
Monitoring & Evaluation
After all activities have been delivered and finalised, contractors must ensure that retrofit has been delivered as designed for final sign-off
Stakeholders involved:
Funder Client; Retrofit Coordinator; Evaluator

Information stage → Preparatory work → Installation & post-installation

G Strategic Delivery Stakeholder Journey Map



H Supply Chain Stakeholder Journey Map



I Beneficiary Case Studies

I.1 The following case studies are intended to illustrate the experiences of some of those who have had measures installed in or on their properties. The photographs were taken during the in-home visits.

Case study 1 – very satisfied with the three retrofit measures installed

I.2 John is retired and lives by himself in an over 55s estate managed by a housing association. Having lived in his bungalow for two years, he knew that the house was quite cold.

I.3 The housing association organised a meeting in the community centre for residents to hear about the retrofit measures Sunderland District Council could offer for free; these included wall and loft insulation and air source heat pumps. At the meeting were representatives from the Council, the installers for the different measures, Arktek and 0800 Repair, and an independent green consultant. Having various presentations to find out more, along with the initiative being visibly backed by the Council and housing association, provided a high degree of reassurance that the scheme was legitimate and likely to be beneficial.

I.4 John's main motivation to sign up was to get measures installed that would help keep the bungalow warmer and reduce his bills. Previously at his own expense, he had had new electric radiators installed to replace very old economy 7 ones and new double glazing, but the bungalow still felt cold. The 'green' impacts of reducing his carbon footprint were irrelevant, partly because they are less clearly understood than the immediate promise of reducing his energy bills.

I.5 John remained unclear why the government or local authority is undertaking such retrofit work and doing it all for free, nor why he has been the lucky recipient of so much investment.

I.6 The process had been smooth and easy. He accepted having to provide certain financial information to see if he qualified, although John noted that some of his elderly neighbours were put off by having to do this.

I.7 The cavity wall insulation only took two days, with the installers removing material from the previous cavity wall injection, before returning a week later to fill the walls with a new treatment. The workmen from Arktek left no mess and were described as very professional. The loft insulation involved laying down a thicker blanket over the previous covering which was already in the loft when John bought the property. He was unaware, prior to the inspection of his property for this scheme, that either aspect needed work.

I.8 The warning notices put in the loft by Arktek reinforced the perception that they are a high-quality, experienced and professional company.

I.9 At the same time, he was offered the opportunity to have an air source heat pump installed, undertaken by 0800 Repair. He was the first person on the estate to get this new type of heating unit fitted. The original owner of 0800 Repair, who now acts as a consultant for the firm, was on-site and able to inspect and oversee the work. This proved useful as this expert noticed that the control system in the loft had been wired incorrectly. Additionally, he was able to move the heating control panel from the loft where it would be inaccessible to John, given his difficulty climbing steps, to being in the hallway.

I.10 The consultant also left his contact details should John have any issues; he subsequently asked him to come back and adjust the temperature on the heat pump as John found his radiators weren't as warm as he wanted them to be.

I.11 The heat pump was fitted with a 'baffling' control system in the loft which looks complex, sophisticated and modern, along with a user-friendly hive control panel in the lounge.

I.12 It was not made clear at the initial meeting that the new radiator pipes would be visible and would need some cladding on the walls, or how noisy the heat pump unit could be (especially noticeable at night) – although John did not see either issue as a major inconvenience.

I.13 Since having the measures installed, no one from Sunderland District Council, the Net Zero Hub, the housing association or the contracting organisation has inspected the work.

Additionally, the work has not been officially signed off. John would have expected some sort of follow-up courtesy visit to check on and sign off the works.

I.14 It is difficult to assess the impact of having these three retrofit measures installed, with John focussing solely on the financial benefits rather than, for example, environmental impacts. Given that the measures have been installed at the same time as the energy price crisis, there is a recognition that bills overall have increased significantly. This means that John is unsure whether he is now using less energy or what his bills would have been without having any of these retrofit measures installed. However, he does believe his house is now warmer than it was previously.

I.15 John would have also liked solar panels installed which were offered through the housing association. However, because the funding window for this measure had passed, John was unable to have these installed.

I.16 John has been very satisfied with the measures installed and the value from the free measures added to his property. The heating from the pump was described as 'comfortable' and 'controllable'.

I.17 Although he has not had any problem with his heat pump, he noted that the instruction manual he was given is technical and unintelligible, and ideally would have preferred something more suitable for a lay person, with simple troubleshooting options or a basic user guide.

I.18 He has not had the heat pump serviced or needed further assistance from an engineer. However, John notes that one of his neighbours has struggled to find anyone qualified to help with her problematic heat pump and had been quoted £1500 for an annual service package. No one at the initial meeting or since had been told about ongoing servicing costs (or the challenges in finding anyone suitably qualified to fix any problems).

I.19 Other neighbours in the estate who also signed up for heat pumps have not had such a positive experience with the same company. They noted having to deal with different workmen who were seemingly inexperienced at fitting such equipment, who have put the control panels in inaccessible places and who have not returned to check on or fix any of the issues reported. Getting the heating installed and set up correctly is a common issue amongst himself and his neighbours, who have needed help to get properly adjusted as they have not been clearly shown or do not understand how to control the system.

Case study 2 – very dissatisfied with both solar panels and heat pump

I.20 One of Colin's initial remarks during the interview was his regret over the decision to install solar panels and a heat pump. He expressed a desire to have them removed to revert to his previous setup. Not only was the installation problematic, but since then, he has had to contact the installers to try to fix numerous problems. Overall, Colin isn't convinced the measures are working properly or saving him any money – rather, he believes they are costing him more to run than his previous gas boiler.

I.21 His perception is the installation (via 0800 Repair) was rushed, with the solar panel team and the heat pump team both being in a hurry to get finished and leave early on the Thursday before the Easter weekend holiday.

I.22 Colin's introduction to the retrofit scheme was through door knocking, with a sales rep offering a range of measures for free. He was surprised he might qualify as he is a homeowner in paid employment and assumed such schemes were only for those receiving benefits. However, with energy bills increasing, and being in some personal financial difficulty, it was an easy decision to sign up for measures that promised to reduce his bills, save him money and add value to his property.

I.23 He experienced several problems during the actual installation:

- Despite telling the installers that he wanted to keep his relatively newly fitted gas boiler, one of the installers took it away in his van. It was only returned when he threatened to call in the police and report it as theft;
- An electrician disconnected wires that went to an outhouse containing a fridge-freezer without asking where these wires connected to or telling the householder what he had done. This resulted in food being spoilt. 0800 Repair eventually accepted responsibility and paid compensation for this;
- Wiring for the solar panels were left hanging from the kitchen wall and pipes for the heat pump were left uncovered (described as looking like an 'industrial installation'). The installers were asked to return and tidy these up, hiding the wires albeit badly (photo on left) and boxing the pipes in (photo on right). This took numerous phone calls and several months before being resolved;
- He was not consulted or given any choice of the location of the heat pump. He wishes it had been put elsewhere, in a more out-of-the-way location; and
- He had to contact the installers to return packaging and unused materials left in his front garden.

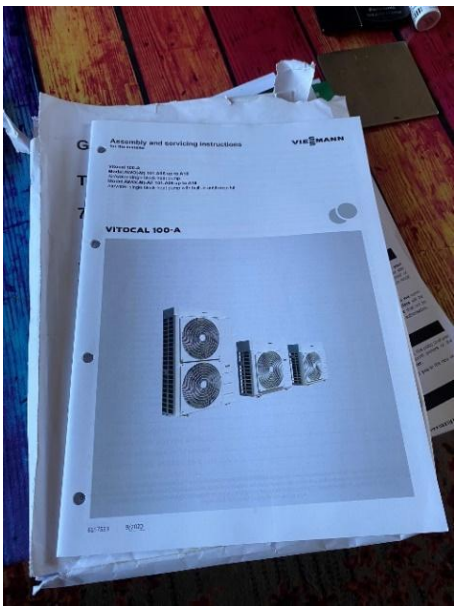
I.24 Overall, the issues experienced are all related to the installer, their rush to get finished, the seeming lack of experience or technical knowledge of the team and the poor quality of their work, with very little care or attention taken.

I.25 There did not appear to be a manager, supervisor or foreman in charge who kept an eye on the quality of the work.

I.26 He was left with the technical installation manual which, for him, is unintelligible. No one explained how either measure worked or how to trouble-shoot any common problems. No one from the local authority, Net Zero Hub or the installers have returned to check on the work or sign it off. Indeed, apart from the research interviews, no one has been in touch to even ask if the measures are working or if they have been useful. He has just been left with the measures.

I.27 Some further issues in relation to lack of information or aftercare include:

- No one has explained how to optimise the benefit of having solar panels in terms of using appliances in the daytime and consecutively rather than concurrently;
- No one has explained or checked he had filled in the warranty for the heat pump within 30 days to get cover for three years; and
- No one has explained how the free-standing thermostat works or left any instructions, but Colin is convinced it is not working as it should.



I.28 It was suggested that having a designated point of contact for resolving any issues would be highly beneficial.

I.29 It remains unclear to Colin if he owns the measures and is responsible for their servicing and upkeep, or if the local authority or the installers have a responsibility to ensure the ongoing function of these measures. This has not been clearly communicated or explained at any stage of the process.

I.30 After two years he is still waiting for a cheque for the excess electricity his solar panels are producing but he is not consuming. Despite being with Octopus, no one during sign-up, installation or since has told him he needs to contact them to sign up for a smart export tariff.

I.31 He is unsure if the heat pump is working as the fan doesn't appear to be functioning. It currently shows an error code on the box, although he has no idea what this means or what he needs to do to fix this. He has looked for a simple troubleshooting guide in the information left but the manuals are all very technical and not considered helpful. Colin also does not know how to check if the solar panels are working.

I.32 His perception is that the installers are making a lot of money from undertaking these government contracts, without doing the work properly or providing sufficient information, instruction and advice householders need to operate the measures.

I.33 After two years the measures installed have caused him significant stress, concern, and problems and he is unconvinced whether the measures have saved him any money off his bills. His gas bill has increased which he feels is because the air source heat pump is not working as it should.

I.34 Ideally, there would be follow-up a month after installation completion, and then after 6 months from the Net Zero Hub or Local Authority. Without this, there is a danger that the considerable sums invested in people's properties are being wasted if the measures are not working or not doing so as effectively as they could to reduce carbon emissions and save the householder money.

I.35 Colin remains unclear as to why he was targeted for such interventions whilst no one else in his street has had solar panels or heat pumps installed.

Case study 3 – very dissatisfied with installation of room in roof insulation

I.36 Eve and her husband, George, have lived in their house for over 30 years. The house is old and gets very draughty and cold in the winter.

I.37 The couple first heard about the scheme from a leaflet that was posted through their door. They were offered insulation for the rooms on the top floor of their house. After a previously very stressful experience with contractors in 2015, they were apprehensive about applying. However, they decided to go for it after a representative from the installation company came to their door. He was very positive and reassured them that the process would be quick and easy.

I.38 Eve was motivated to sign up because she wanted to make their home warmer and felt that insulating her draughty house would be the best way to help the environment.

I.39 She believed that the scheme was being offered by the government and the council to get more homes insulated.

I.40 When the installation started, problems arose almost immediately. A plumber came to their house to remove a radiator off the wall before the insulation was installed. He took the radiator off incorrectly, resulting in a major leak.

I.41 Although they had been reassured that the process would be quick, the first team of installers arrived late. They came in to take down the plasterboard but only stayed for a few hours and left the installation unfinished. The team that came next to fit the insulation was left to sort out the previous team's issues, so they then had to rush the rest of the installation. Amongst other similar issues, the contractors cut up their skirting boards so they could be removed, despite Eve asking them to prevent this beforehand. Eve felt that the rushed nature of these installations indicated that the company had taken in too much work.

I.42 It did not appear as though a single person was overseeing or coordinating the work. As such, Eve and George felt like they were left to project manage the work themselves.

I.43 When the contractors told them that they were finished and left, Eve and George went upstairs and found that it had been left a mess. The contractors had left bags of plaster and pieces of plasterboard, and the walls and floors were splattered with plaster.

I.44 After Eve complained, the company sent a cleaner out, who then left after an hour. The couple complained again and eventually, a manager came out and sorted a few of the problems for them. But by this point, it was too little, too late.

I.45 They were promised that the process would take a week; it ended up lasting over a month.

I.46 Eve was also surprised at how little the council was involved. The only instance they saw a representative from the council was when a member came to check that they had an extractor fan installed. Eve felt that they should have checked over the work more thoroughly once it was completed.

I.47 Although the couple appreciated that the insulation was keeping the house a lot warmer, the entire experience caused them considerable stress. When describing the installation process, which had been completed over a year ago, Eve was very emotional and was close to tears at points. She did not want anyone to experience what she and her husband had gone through.

Case study 4 – very satisfied with air source heat pump

I.48 When Brian first heard about the scheme, he was eager to participate. His local authority sent a letter telling him that he may be eligible for an air source heat pump. He saw this as a great opportunity to replace his existing liquid petroleum gas (LPG) heating with an up-to-date system, that would be cheaper to run.

I.49 Brian had a few issues with communication in the run-up to the installation. The council gave him a number to contact E.ON, which turned out to be the wrong number. After some searching, Brian managed to get in contact and a surveyor from Warmer Energy, who was then sent out to check his property.

I.50 Once the surveyor checked his home, Brian heard nothing for four months. He was still eager to have a heat pump installed, so he contacted Warmer Energy, and they sent another surveyor out. Again, he heard nothing back, so he chased Warmer Energy up who then scheduled the installation for the following week.

I.51 Once the installers finally came out, Brian was happy with the rest of the process. The surveyors had explained what the installation would involve and how long it would take, so he knew what to expect.

I.52 The contractors who came out to install the heat pump were tidy, polite and quick. They explained what they were doing and made sure to check with Brian that he was happy with where the pipes were placed. It took them a day and a half to install the pump.

I.53 Although he was very satisfied with the work, Brian suggested it would be helpful to have a project manager oversee the installations in case any issues arose.

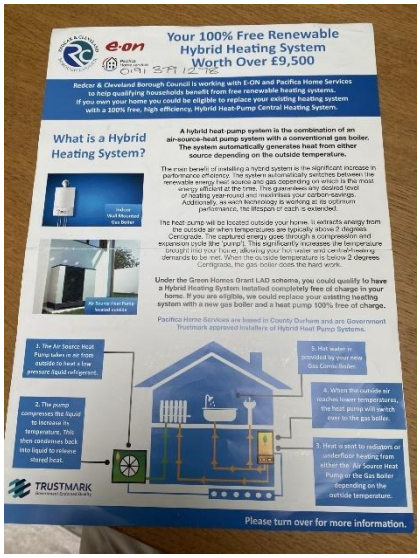
I.54 He also thought it would be useful to have a review system for the installation process. He would have liked to see other people's experiences getting heat pumps installed when he was initially researching, which would help inform his own decision. He felt that there wasn't a lot of information online to help people make a decision.

I.55 After a year, Brian had the pump serviced by a local company that came across a minor issue. Brian was able to contact Warmer Energy and they sent an engineer out to fix the problem.

I.56 Brian was very happy with the heat pump. It was more reliable than his old heating system, it kept his house warm and was quiet to run. He felt that the instructions and manual left by Warmer Energy were easy to use, informative, and would be helpful in future if he ever came across any issues.

Case study 5 – very poor experience with air source heat pump

I.57 From the outset Jackie and Jack repeatedly described the entire experience of getting the air source heat pump as 'utterly chaotic,' and the disturbance was described as 'awful'. They went as far as to say that they wish they never got the air source heat pump.



I.58 The couple initially heard about the scheme when a flyer came through the post – they were first intrigued as the leaflet looked legitimate, having both the council and EON logo. However, Jackie and Jack were both confused about why they were selected for the scheme.

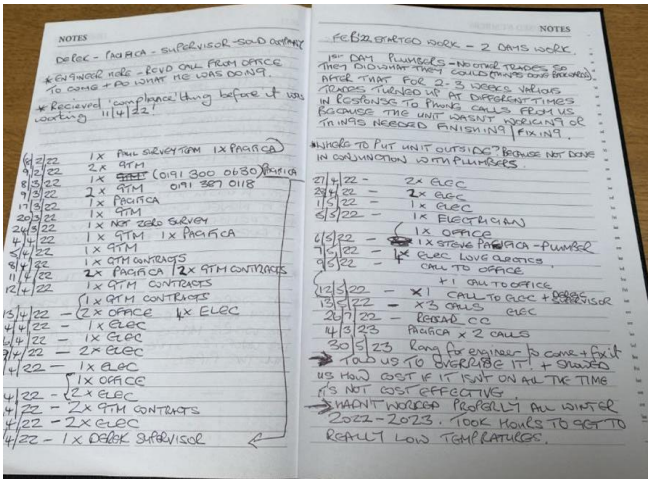
I.59 Jack decided to ring the number on the leaflet as he believed the measures suggested would not only reduce the cost they incur when they heat the house but would also improve their green credentials. Another key appeal was that the measure would be entirely paid for by the government. After calling, the council stated they would send an engineer to examine their house within a few weeks.

I.60 A significant problem throughout the entire process was that the couple was unsure who they were dealing with a lot of the time; there was 0800 Repair, Pacifica, EON, GTM contractors, Oaks Engineer Services Limited, and more organisations that they were unable to remember.

I.61 From the beginning of the installation there were constant issues. Rather than working together over two days as initially suggested, the installation took weeks and contractor visits were unpredictable. The couple felt as though they had to be apologetic to the contractors, who made them feel like installing the air source heat pump was an inconvenience.

I.62 There was no communication between installers, and the couple themselves had to update the contractors with what had been done and by whom. They also had to make an endless number of phone calls to keep the process moving (see photo below).

I.63 Jack described the installation process as 'piecemeal'; all the electrics and piping were finalised nearly a month in, and then later another contractor came, lifted the pump, put it on slabs, and concreated it in, disturbing the work that had previously been done. Even after this point when the process was considered finished, the pump failed to work. The couple were appalled with the mess the contractors had made where the boiler was installed, and wished they'd been warned about the size of the heat pump before they agreed to the installation.



I.64 After installation, the air pump required two new motherboards. Finding someone who could fix this issue was an incredibly long-winded process.

I.65 Through the first winter with the air source heat pump installed, it took 5 hours for the house to slightly warm up, which they assumed was normal as they were not informed about how the installation should perform. This meant that the couple went the entire winter with very little heat.

I.66 When somebody did eventually come to look at it, they found it was set at the wrong temperature, explaining why it had consistent issues (e.g. tripping on and off). To make it worse, they described the person who came to fix it as 'unpleasant.'

I.67 To this day, the air source heat pump does not bring the house to a warm temperature - often it is the gas boiler compensating for the lack of heat from the heat pump, negating the point of the heat pump installation.

I.68 While the couple now find themselves using less gas, they are using more electricity – which is unfortunate when the cost of electricity is much higher. Pre-instalment they had hope that their heating system would be better than it was, but it is now worse. Two years later, they still see no benefit and are unsure whether it has saved them any money at all.

I.69 If somebody came and offered to remove the air source heat pump now, they would take up this offer with no hesitation.

Case study 6 – excellent experience with solar panels

I.71 Immediately after hearing about the scheme through Martin Lewis' Money Saving Expert website, Alex was very eager to learn more. Alex devoted quite a lot of time researching the scheme; he did background research into the eligibility criteria and contacted contractors within his local authority to inquire further.

I.72 To Alex's knowledge, the scheme was a government scheme to improve house efficiency. The environmental impacts were explained to him in the process of applying.

I.73 After applying for the scheme, Alex instantly heard back, and exclusively dealt with one company throughout the entire process which made contacting them easy. Even when having his Energy Performance Certificate completed, there was ample opportunity to ask questions.

I.74 Subsequent to his application, Alex was contacted by telephone, followed by an email confirming he was successful in his application and making him aware of the dates for the scaffolding work. Within a few days, the contractors arrived and fitted the solar panels in half a day, followed by a visit from the electrician who was, again, finished within half a day.

I.75 Even though the contractors were a couple of days late, there was a clear line of communication from the company, who were very responsive in providing Alex with a new date to fit the solar panels.

I.76 Alex described the contractors as polite, professional and tidy. All evidence of the installation was properly cleaned up, which he was very pleased with. He also remembers the company offering to bird-proof the panels whilst they were installing them. While this was at a cost, and he did not accept the offer, Alex appreciated them providing him with the option.

I.77 Whilst the actual installation was a fast process, removing the scaffolding from his property was not. Alex was stuck with scaffolding at the front of his property for a month, and despite ringing the company, was completely left in the dark about when these would be taken down.

I.78 At the time of installation, Alex felt he was very informed of everything he would potentially need to know. However, a year later and after doing some research on Google, he soon realised the contractors failed to tell him he outright owned the solar panels. This meant Alex lost out on around £300 from solar export from his electricity company, and he was very disappointed about this.

I.79 Post-installation, Alex was provided with certificates, references of who to contact with any problems, his warranty and kilowatt information specifically for his solar panels. In addition to this, the contractors talked through the smart meter and inverter box to explain how to tell when the solar panels are working.

I.80 After sorting the electricity export, Alex has saved over £300 over the course of the past year and is incredibly satisfied with his new solar panels.

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