



Department for
Energy Security
& Net Zero

Social Housing Decarbonisation Fund (SHDF) Wave 1

Process Evaluation Report: Technical Annex

By IFF Research, Technopolis Ltd, Building Research Establishment (BRE)
and University College London (UCL)

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1 Evaluation overview

1.1 Introduction

This is the technical annex for the Wave 1 process evaluation report (the first of two externally commissioned Wave 1 evaluation reports). An impact evaluation report for Wave 1 will be published separately in 2025. The process evaluation for SHDF Wave 1 aimed to address four evaluation questions¹:

1. How effectively has the SHDF Wave 1 scheme been implemented and delivered?
2. To what extent and how have Wave 1 projects performed as intended?
3. To what extent and how has Wave 1 incorporated lessons learned from other DESNZ energy efficiency schemes and the SHDF Demonstrator (SHDF(D)), to inform the design and delivery of the waves?
4. To what extent and how has the design of Wave 1 effectively supported both wave-level and overall SHDF achievements?

The main report also provides early findings related to the following research question: “To what extent, and how, has Wave 1 delivered benefits for social housing residents, including delivering warm, energy-efficient homes, improved resident health and wellbeing outcomes, and reduced risk of fuel poverty?”.

1.2 Methodological approach

The Wave 1 process evaluation takes a mixed methods approach, drawing on surveys and interviews with stakeholders and beneficiaries, and secondary data, and synthesising findings against process evaluation questions.

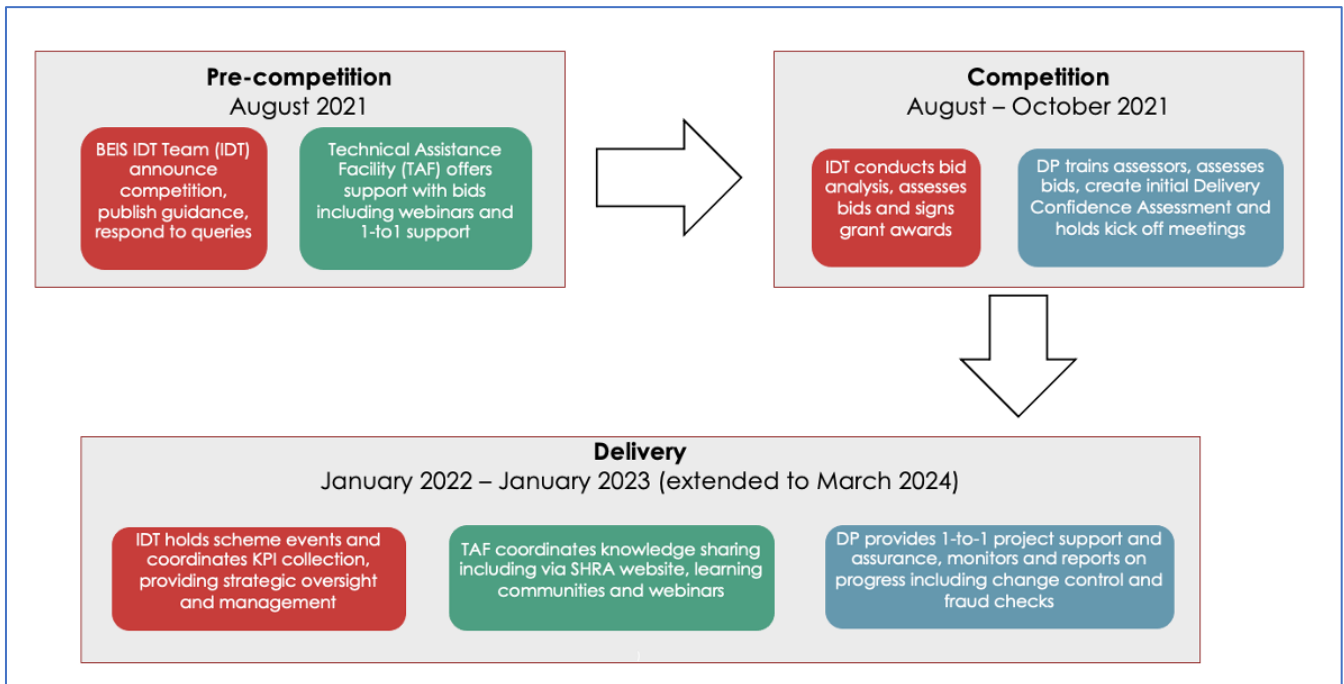
In an initial scoping phase, the evaluation team first developed a [Theory of Change](#) (ToC), from which evaluation questions and a methodological approach, incorporating both primary and secondary data, was established. As part of this, the evaluation team engaged an expert panel to provide scrutiny and quality assure the approach.

The processes covered in the evaluation are summarised in Figure 1 below. Data sources available were mapped to the detailed evaluation questions in a separate spreadsheet.²

Figure 1: SHDF Wave 1 key processes and relevant organisations

¹ Detailed evaluation questions are available in [3. Detailed Evaluation Questions](#)

² Available [here](#).



The following data sources were drawn upon extensively to address the process evaluation questions:

- Resident survey and interviews
- Interviews with supply chain representatives
- Interviews and focus groups with Social Housing Landlords (SHLs)
- Interviews and focus groups with staff representing DESNZ senior management and the Integrated Delivery Team (IDT) team, the Delivery Partner (DP), and the Technical Assistance Facility (TAF)
- Secondary data, including application and scheme monitoring data

These are discussed in more detail in other sections of this technical annex. The evaluation also incorporated case studies to explore projects and themes of particular interest. More details on these are provided in the next section.

1.3 Case study approach

Overview

Case studies have formed a central part of the Wave 1 process evaluation. Their purpose is to provide an in-depth examination of key projects and themes. Six project-based case studies and two thematic case studies were developed for the Wave 1 process evaluation. Case studies were used for sampling SHLs, residents and supply chain stakeholders for interviews and focus groups, as described separately in other sections of this annex.

Selection of case studies

Six Wave 1 projects were selected to be case studies for the process evaluation, which were:

-
1. Durham County Council
 2. Coventry City Council
 3. London Borough of Waltham Forest
 4. Norwich City Council
 5. Crawley Borough Council
 6. Liverpool City Region Combined Authority

The process for selecting case studies began by creating a shortlist of projects meeting a number of priority areas for developing further understanding of them. These shortlisted projects were then checked in line with other criteria to ensure there was good representation of a range of project characteristics.³ The final selection of case study projects was agreed with DESNZ.

For the three thematic case studies, Technopolis suggested some initial ideas for themes to explore which would bring additional value rather than duplicating core analysis already being undertaken for the process, impact or economic evaluations. DESNZ then agreed the final three themes to be covered, listed below:

- PAS 2035.
- Hard-to-treat properties.

Case study reporting

Case studies were written up as concise, self-contained reports, published separately alongside the Wave 1 Process Evaluation report.⁴ Case studies draw upon a wide variety of data sources including secondary delivery data and primary data collected with SHLs, residents and supply chain stakeholders. Availability of data sources varied across case studies, as detailed in each case study report.

2 Theory of Change

The ToC describes the aims of Wave 1 and the processes by which the inputs and activities are expected to lead to outputs, outcomes, and benefits. Developing a ToC is a key first step of any evaluation, as it sets out an agreed understanding of what outcomes are expected and necessary to assess success of the scheme in question. The ToC was used to develop evaluation questions and a methodological approach, incorporating both primary and secondary data.

³ These covered: Geographical mix; inclusion of consortia projects; mix of archetypes covered; inclusion of mixed tenure properties; inclusion of clean heat installations; inclusion of some properties with an EPC rating of lower than D; mix of installation stakeholder configurations; mix of those who received SHDF(D) and other government funding (e.g. from Sustainable Warmth, LAD schemes).

⁴ The third thematic case study on “Retrofit activity of SHLs not participating in Wave 1” will be written and published later in the evaluation and won’t be published alongside the Wave 1 Process Report.

The process evaluation focuses on the inputs, activities and outputs of the ToC. Where emerging evidence was available, some early analysis of relevant outcomes was conducted and findings included in the report (as detailed in [Section 3: Detailed Evaluation Questions](#)). The impact evaluation will use Contribution Analysis to assess Wave 1's contribution to outcomes and impacts, including assessment of energy savings.

The overarching ToC, and the different causal pathways captured within, are presented in detail in sections 2.1 to 2.6 below.

2.1 SHDF Wave 1 and Wave 2.1 rationale and objectives

The UK has legislated to reduce greenhouse gas emissions to net zero by 2050. The UK has some of the oldest, and least energy efficient, homes in Europe. To reach net zero, it is necessary to almost entirely decarbonise homes. The 2019 Conservative manifesto included a £3.8 billion commitment through the Social Housing Decarbonisation Fund (SHDF) for investment up to 2030. The SHDF focuses on improving the energy performance of social housing in England.

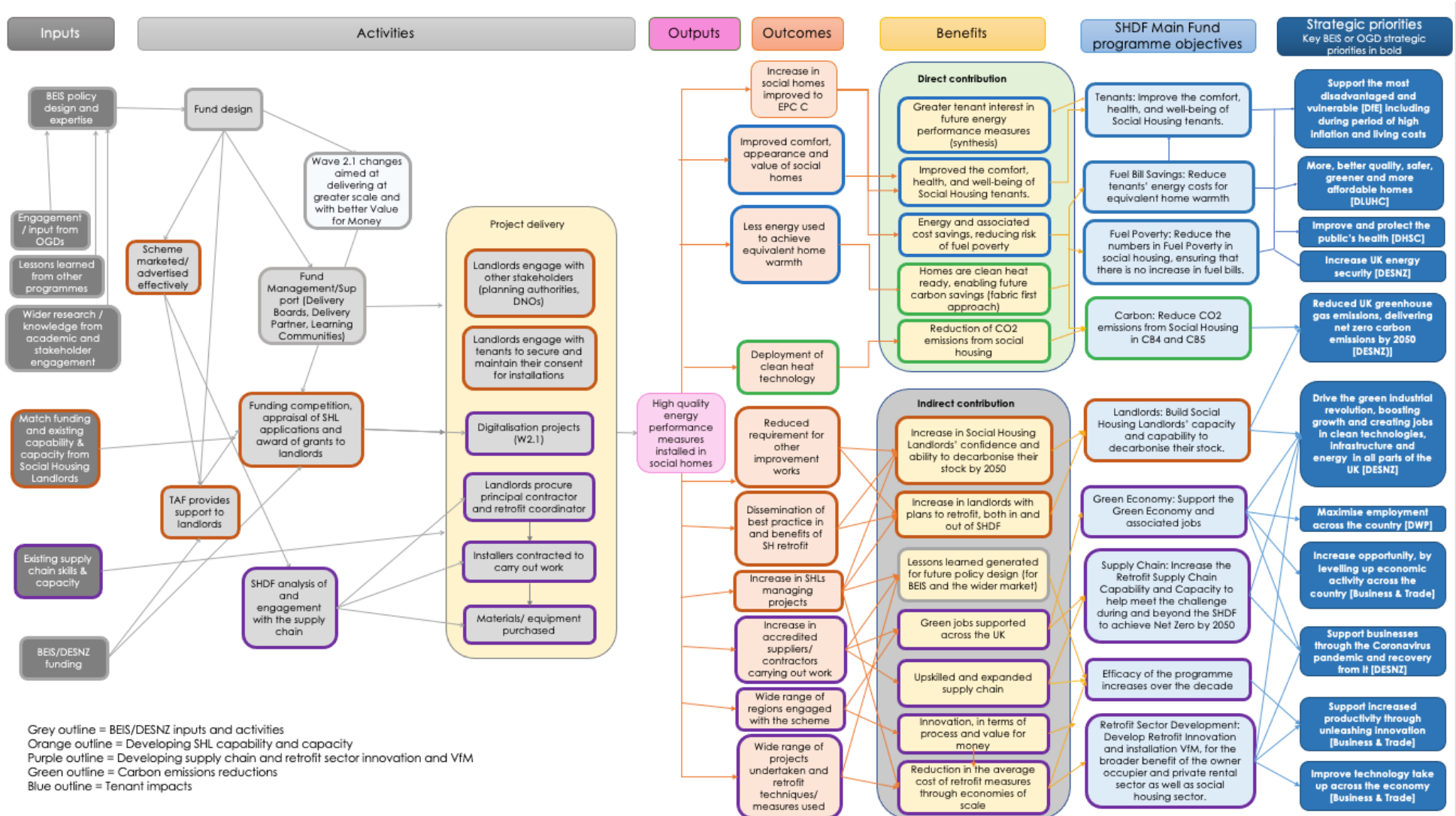
The SHDF(D) was announced in the 2020 Summer Economic Update and awarded £62 million fund for SHLs to test innovative approaches to retrofitting at scale. Building on the SHDF(D), the SHDF Main Fund has taken a waved approach, whereby each wave of funding is designed to reflect the current context whilst also remaining focused on delivering the anticipated programme outcomes. The investment will see SHLs improve the energy performance of their properties through the installation of energy efficiency measures and low carbon technologies. This is expected to have a positive impact on residents' lives, reducing bills, improving thermal comfort, and reducing the number of residents in fuel poverty. It is also expected to help build capability in the supply chain and social housing sector, developing knowledge and capacity to deliver social housing retrofit and beyond. The first two waves (Wave 1 and Wave 2.1) are the focus of this evaluation.

The objectives of both waves are:

- Reduce CO₂ emissions from social housing in Carbon Budget (CB) CB4 and CB5.
- Improve social homes to Energy Efficiency Rating (EER) C.
- Reduce the numbers of social housing residents in fuel poverty, ensuring that there is no increase in fuel bills.
- Improve the comfort, health, and well-being of social housing residents.
- Develop the green economy and associated jobs.
- Develop retrofit innovation and installation value for money (VfM), for the broader benefit of the owner occupier and private rental sector.
- Increase the retrofit supply chain capability and capacity to help meet the challenge during and beyond the SHDF to achieve Net Zero by 2050.
- Build SHLs' capacity and capability to decarbonise their stock.

The logic models presented below set out the pathways through which impacts are expected to be achieved against Wave 1 and Wave 2.1 objectives. The narrative presented in the sections below describes this in detail.

Figure 2: Overarching logic model



2.2 Government inputs and activities: funding, design and management

The following section describes the government inputs and activities that contribute to Wave 1 impacts.

Government inputs

BEIS (now DESNZ) allocated £179 million for Wave 1, using Section 31 of the Local Government Act to provide funding. The other principal government input was the policy design and expertise of BEIS supported by engagement with and input from other governmental departments, lessons learned from the prior SHDF(D) scheme, other domestic energy efficiency schemes and wider research and knowledge from academics and other stakeholders.

Government activity: Wave 1 design

BEIS policy design and expertise, and learnings from the SHDF(D), were used to develop the design for Wave 1 with key features intended to focus and maximise the impacts of the scheme. It was also expected that learnings from Wave 1 would feed into future SHDF waves (as they did for Wave 2.1) and potentially wider policy and programme design at DESNZ. Key features of the scheme design and their rationale are described in turn below.

Co-funding requirement and applicant eligibility

A co-funding requirement was set up for Wave 1 to establish accountability and ownership of projects among SHLs as well as to add to the scale of installations undertaken. SHLs were responsible for bringing in a minimum of 33% of the required funding in Wave 1. Applications had to be led by a Local Authority (LA). Registered Providers (RPs) could apply as part of a consortium bid.

Eligibility and prioritisation of properties to be retrofitted and high-quality measures to be installed

SHLs were expected to take a fabric first approach to installations to improve properties to Energy Performance Certificate (EPC) C, or EPC D where EPC C was not possible for properties which were originally at EPC F/G. Wave 1 used cost caps to provide more funding for homes with the lowest EPCs. This was intended to target funding at these properties first and foremost to provide value for money.

Eligible measures under Wave 1 included low carbon heat (to contribute to carbon emissions reductions), where a fabric first approach was taken and the new heating system alone would reduce bills and separately to the installation of other measures.

In their bids, projects were allowed to include some mixed tenure properties. This was to enable retrofitting of social housing where in fill properties were present. Over seventy per cent of properties in the bid had to be social housing.

In order to ensure quality of work, and reduce the risk of poor performance and limited achievement of energy and carbon savings, measures had to be installed in line with PAS 2035 and installers had to be Trustmark accredited or equivalent.

Delivery window

The delivery period for Wave 1 was intended to be twelve months.

Technical Assistance Facility (TAF)

The inclusion of TAF was intended to provide support to SHLs in pre-competition stage through information and workshops to enable them to develop effective project plans and bids (as discussed in more detail in later sections).

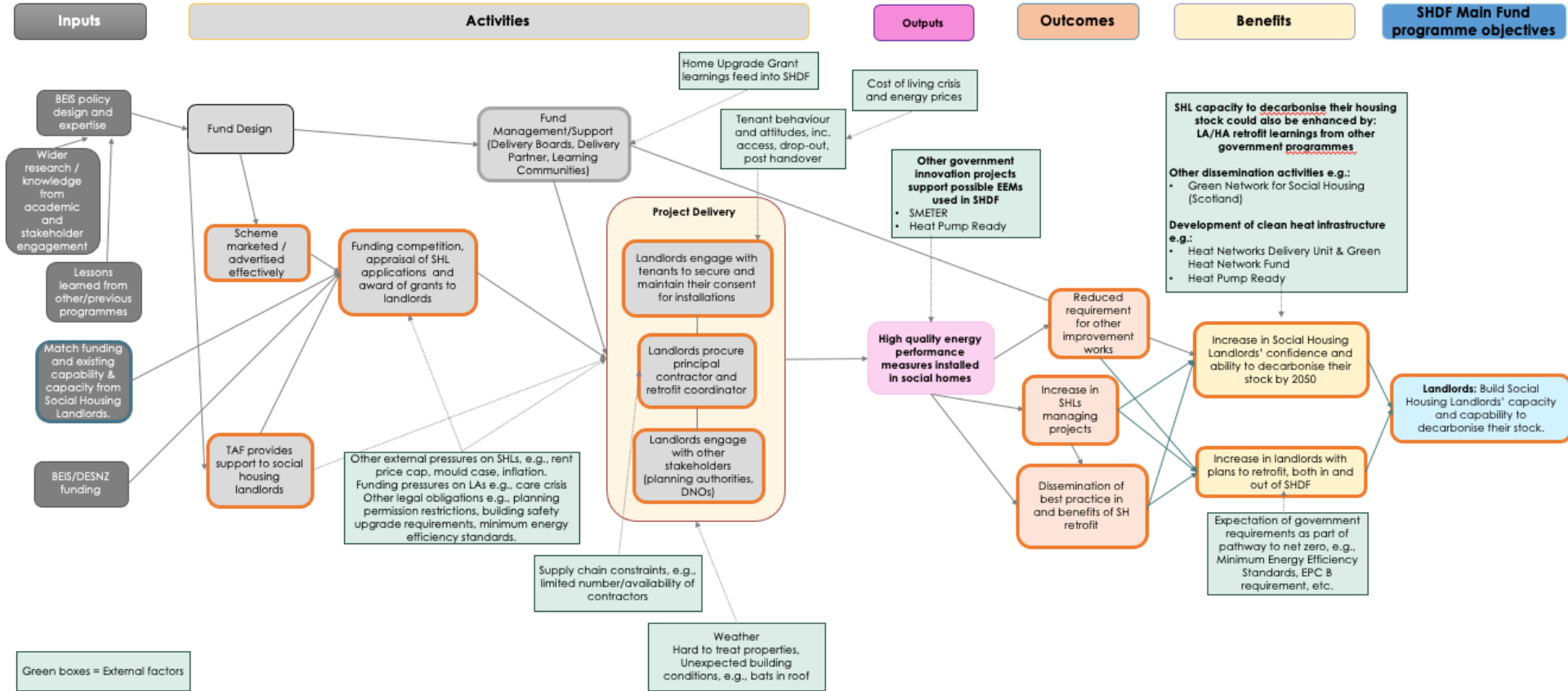
Government activity: Wave 1 management

Scheme management and support activities for SHLs were key aspects during the set up and delivery phase of projects. Scheme management included BEIS/DESNZ Delivery Boards and the DP. The Delivery Board was in charge of decision making on change control and milestone payments at the BEIS/DESNZ level. The DP is an externally sub-contracted agency which led regular day to day engagement with projects, and communicated progress to DESNZ, identifying underperformance, providing inputs to and assurance of critical project decisions and building action plans where things went wrong. The inputs of all these bodies and the processes they delivered were intended to support successful execution of projects thereby enabling achievement of impacts in an efficient manner.

2.3 The pathway to building SHL capacity and capability to deliver retrofit projects

A key objective of Wave 1 was to increase the capacity and capability of SHLs in decarbonising their housing stock. This section describes inputs and activities that are part of the causal pathway related to intended impacts of increasing capacity and capability of SHLs (Figure 2).

Figure 3: Building SHL capacity and capability to deliver retrofit projects



SHL Inputs

Co-funding from SHLs was a key input for Wave 1 (minimum 33% of total project costs).

Assumption: SHLs are able to secure the minimum co-funding necessary to apply for bids and carry out retrofits.

External Factor/Risk: SHLs face competing priorities and fiscal pressures which may decrease the budget available for energy performance retrofits. These include statutory and legal obligations such as for building fire safety and other ongoing maintenance requirements and investment in the development of new housing stock. SHLs also face ongoing fiscal pressures arising from the economic context and high inflation. In particular, LAs have a wide range of other competing priorities not related to housing.

External Factor/Risk: Inflation, rising material costs, and unexpected maintenance or preparatory work needs during project delivery may increase project costs. The BEIS/DESNZ funding input is fixed and SHLs may have insufficient additional budget to meet unanticipated costs.

Activities involving SHLs

Scheme marketing was an important activity to drive participation and support the formation of strong bids for Wave 1. Wave 1 included a significant launch/mobilisation event to alert and inform potential SHL bidders about the competition. Competition guidelines were published on the Government website. Marketing and engagement activity consisted of a five-tiered approach to SHLs, based on level of potential interest. Both TAF (discussed below) and consortium partnerships supported SHLs in identifying suitable homes for retrofit and modelling.

Risk: Marketing and engagement activities do not reach enough or the appropriate SHLs to produce quality bids.

The **Technical Assistance Facility (TAF)** provided support to SHLs in pre-competition stage through information and workshops on retrofit opportunities and technologies, procurement and supply chain engagement, resident engagement, and putting a bid together, to help build SHL understanding of retrofit and drive more, larger and stronger bids. Lessons from the SHDF(D) further showed the need to support SHLs with information across these domains.

Assumptions: SHLs access and use TAF resources. The support is sufficient and appropriate in building SHL capacity and capability to make successful, high-quality applications.

Risk: Delay in the set-up of TAF and funding limitations on TAF limit the number of potential bidders they can support.

External Factor: SHL capability could be enhanced through shared lessons of energy performance retrofits conducted through other government initiatives e.g. Homes Upgrade Grant, Green Homes Grant.

The **Funding Competition** activity was the phase where SHL applications were appraised and grants were awarded to the best applications. The funding granted through this competition was used by SHLs to plan and commission energy performance installation projects in their housing stock, which they could not otherwise afford to undertake at the same pace, at the same scale or to the same level of quality.

Assumptions: Wave 1 requirements are sufficiently aligned with SHLs' wider maintenance plans for them to proceed with applications.

Assumption: SHLs have sufficient and accurate data on their stock to develop effective plans for installing energy performance measures via Wave 1.

Risk: SHLs have insufficient understanding of and data on their stock.

Risk: Bidders have difficulty forming consortia and building trust between different SHLs, leading to fewer and smaller bids with peppered stock (due to mixed tenure) and poor modelling of stock (due to low LA modelling capacity).

Risk: SHLs perceive the policy context as too uncertain to validate the effort and investment of energy efficiency projects. They may also be concerned that future regulation will have different requirements creating a risk that any earlier work has to be adapted/re-done and is not cost effective. Given that housing decarbonisation is at an early stage, SHLs may also prefer to wait until approaches are more established.

External factor: SHLs may also be motivated to apply to Wave 1 because they have internal commitments to reduce their carbon emissions, this addresses Environmental, Social and Governance (ESG) requirements and/or this also helps satisfy other objectives such as reducing mould and improving living conditions more broadly.

The **scheme management and support activities for SHLs** (discussed previously) were key aspects during the set up and delivery phase of Wave 1 projects. The DP's role included facilitating lesson learning among participating SHLs, and those taking part in HUG, and dissemination to non-participating SHLs.

Assumption: SHLs engage fully with the DP and opportunities for cross-learning. The support is sufficient and appropriate in building SHL capacity and capability in delivery processes.

Project Delivery

The following describes activities undertaken by Wave 1 projects within the delivery phase.

Resident engagement and consent

SHLs engaged with residents to secure and maintain their consent for installations. SHL engagement was undertaken via tenant liaison officers and retrofit coordinators. It drew upon with TAF/DP guidance and lessons learned. Buy in and consent for installation of energy performance measures was achieved because residents understood the potential benefits including reduction in energy costs and improved comfort and property. They saw these as

outweighing the potential risks/challenges, for example, disruption of installation, use of new technology.

Assumptions: Residents continue to provide consent for installation of energy efficiency measures because these are organised alongside other maintenance works and/or generally in a way that minimises disruption.

Risk: Resident resistance to or difficulties experienced during works reduces the number of projects moving forward.

External Factor: The cost-of-living crisis could encourage residents to consent to energy performance measures because they expect to save money. However, the crisis could also cause stress increasing resident resistance to change.

Procurement of a principal contractor and retrofit coordinator

SHLs procured a principal contractor and retrofit coordinator. The TAF pre-bidding support was meant to guide SHLs on the channels and process of contracting retrofit coordinators, with plans in place pre-bid. PAS 2035 guidelines required under the grant also outlined the steps SHLs could expect to undergo through the retrofit process. Once contractors were appointed, SHLs were expected to manage the projects, risks and delivery with the contractors. TAF provided insight into project management prior to applications, and the DP provided ongoing technical support to SHLs. SHLs were expected to develop risk logs and project plans to mitigate issues. The use of a principal contractor added value by bringing together and managing a consortium of suppliers and installers. This reduced the administration and transaction costs for SHLs as they only needed to manage the principal contractor. It also potentially offered economies of scale in coordination of works and improved value for money.

Assumption: TAF pre-bid support and DP in-delivery support are sufficient in enabling SHLs to connect with and contract retrofit coordinators.

Risk: The supply chain is not sufficiently developed to meet the needs of SHLs (discussed further in the next section on the supply chain).

SHLs engage with other stakeholders

SHLs also needed to engage with other key retrofit stakeholders e.g. planning authorities and Distribution Network Operator (DNOs) to execute projects successfully.

Assumptions: SHLs are aware of the need to engage with these stakeholders, have the capability and capacity to do so, and/or are provided with support through the DP.

Risks: Poor engagement from DNOs (e.g. for power cable access) and difficulties with planning permission lead to project delays. Planning permission may particularly be an issue where the intention is to install external wall insulation.

Output: As for the main diagram, the installation of high-quality energy performance measures in social homes is the key output of Wave 1.

Risk: Poor weather conditions, or unexpected risks (bats in roof, preliminary work) can cause delays, require extra budget, or reduce the number of projects moving forward.

Outcomes for SHLs

Increase in SHLs managing high-quality energy performance retrofit projects

The increased capacity of SHLs to manage high-quality energy performance retrofit projects is a key outcome for Wave 1, and is driven by the availability of funding, enabling a larger volume of high-quality energy performance works to be carried out in a more efficient manner than otherwise. In addition, the above activities explain how gaps in SHL capabilities were overcome to facilitate delivery of these projects.

Dissemination of best practice in and benefits of social housing retrofit

Another important outcome is increased sharing of knowledge provided through TAF and the DP, via the online knowledge sharing platform Social Housing Retrofit Accelerator (SHRA) and case study reports on best and cost-effective practices. Knowledge sharing can also reach those not currently participating in Wave 1.

Reduced requirement for other improvement works

An additional outcome is a potential reduction in requirements for other improvement works, for example, to deal with condensation and damp, from homes that are improved through Wave 1. These homes are expected to have better insulation as well as ventilation, thus decreasing the prevalence of mould and degradation due to dampness. This increases the home's value and available budget for further measures or other retrofits across the SHL's housing stock.

Benefits for SHLs

The above outcomes lead to two of the key benefits provided by Wave 1:

An increase in SHL confidence and ability to decarbonise their stock

SHL confidence and ability to decarbonise their stock is improved through staff learning and the development of new processes and resources on their funded project. It is also likely to be enhanced by cross-learning with other projects and HUG.

An increase in SHL plans to retrofit

The learning and confidence building derived from undertaking projects is expected to increase the plans of SHLs to retrofit.

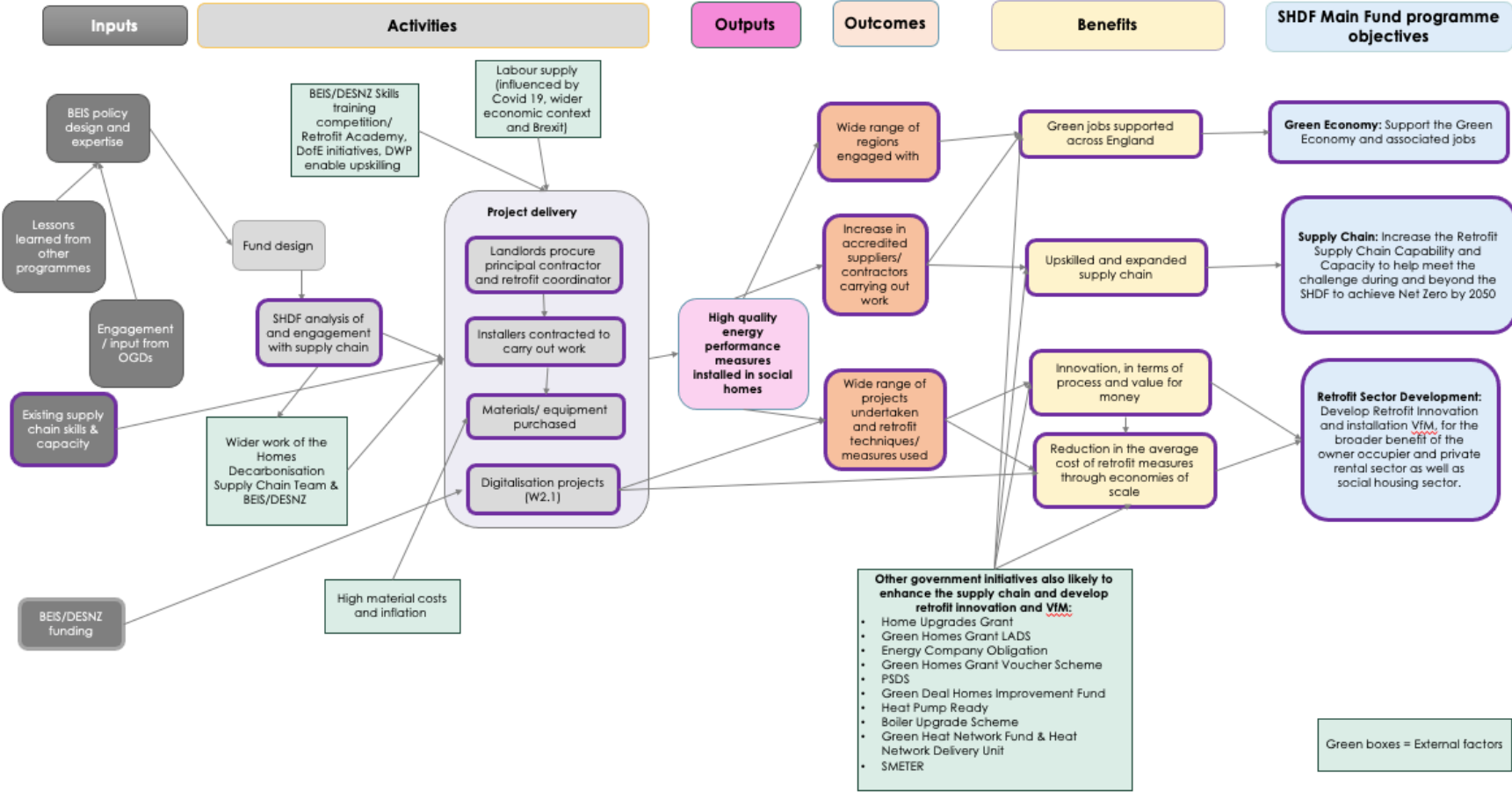
External factor: Currently or in the future, there may be an expectation amongst SHLs that government will introduce new regulations on the energy performance of social housing as part of the pathway to net zero, for example, minimum energy efficiency standards, EPC C requirement, etc. This may motivate SHLs to undertake activity independently thereby potentially reducing the additionality of Wave 1.

External Factor: SHL capacity and capability to decarbonise their housing stock could also be built through other government or housing sector initiatives. However, SHLs are not expected to be accessing other government energy efficiency schemes in significant numbers. Other stakeholder housing sector organisations may disseminate information on decarbonisation of social housing stock. Government support for clean heat infrastructure and initiatives will also facilitate future decarbonisation of social housing stock.

2.4 The pathway to supply chain building, retrofit innovation and Value for Money

Wave 1 of the SHDF has objectives to develop the green economy and associated jobs, to develop retrofit innovation and installation value for money, and to increase the retrofit supply chain capability and capacity. This section describes inputs and activities that are part of the causal pathway related to these benefits (Figure 3).

Figure 4: Supply chain capacity and capability building, retrofit innovation and value for money



Supply chain inputs

Existing supply chain skills and capacity

In addition to the inputs already described, there is an existing body of expertise and knowledge within the retrofit supply chain to support delivery of the decarbonisation of the UK housing sector. However, there has been a significant gap in labour skills and capacity in terms of what is required to meet the burgeoning demand from this and other housing retrofit initiatives on the pathway to net zero. The large Wave 1 investment and subsequent substantial pipeline of retrofit measure requirements are intended to signal to the supply chain market the case for investing in upskilling and capacity building.

Activities involving the supply chain

Supply chain analysis

Over the course of the SHDF Main Fund, there have been two strands of analysis to map and understand supply chain capabilities and constraints. The first strand involved partner analysis of the successful 69 bids in Wave 1. The second strand focused on the wider supply chain market and included a data led assessment of market capacity based on existing data available across all energy efficiency economic stimulus scheme in Wave 1. These exercises highlighted a range of pressing challenges in the supply chain including rising material and labour costs, shortage of qualified installers and retrofit coordinators and the need for policy certainty in government investment to support supply chain activity.

Supply chain engagement

Wave 1 implemented engagement plans and strategies to ensure the supply chain market was aware of the financial opportunities available. These activities aimed to instil confidence to invest in expanding capacity in material and labour supply. Following key trade body engagements and the review of Wave 1 bids, a taxonomy of SHDF supply chain was developed including labour, skills, materials, contractors and leadership and sponsorship (SHLs). A range of stakeholders were mapped against the taxonomy and engaged to gather sector specific insights.

Project delivery

Thanks to SHDF team engagement and wider BEIS interaction with the supply chain, SHLs were able to appoint retrofit coordinators. These coordinators were then also able to secure accredited installers and source high-quality materials to install energy performance measures. The DA supported management of contracts for these service subcontractors to ensure successful delivery.

Assumption: The different individuals and organisations within the supply chain are able to work effectively together to deliver the installations as required.

External factor/risk: Price inflation causing high materials and/or labour costs may delay projects or reduce the number of installations.

External factor: SHDF team interaction with the wider work of the Homes Decarbonisation Supply Chain Team and BEIS informs the Wave 1 supply chain engagement approaches and facilitates cross-learning. Other BEIS programmes like the Skills Training Competition/the Retrofit Academy and Department of Education initiatives provide upskilling opportunities for installers and retrofit coordinators.

Risk: Parallel portfolio-level energy efficiency schemes run the risk of cross-cannibalising supply chain resources leading to delays and cost overruns.

External factor/risk: The supply chain finds new build work and/or other private sector opportunities more attractive than those of Wave 1.

Output: The key output for Wave 1 is the installation of high-quality energy performance measures in social homes.

Outcomes relating to the supply chain

The installation of measures leads to a number of outcomes relating to the supply chain and retrofit sector.

Wide range of regions engaged with

Energy performance measures are installed in regions across England.

Assumption: Projects are awarded in a relatively balanced way across the regions.

Risk: Supply chain constraints in specific areas limit achievement of this outcome.

Increase in accredited suppliers/contractors carrying out work

In response to the large pipeline of Wave 1 projects and SHDF team engagement with the supply chain, the supply chain expands capacity and capability such that retrofit coordinators, installers and materials are available for use on projects. The requirement for Trustmark/MCS drives suppliers to invest in achieving accreditation. In some cases, SHLs undertake work in-house and reskill their existing workforce to undertake standard fabric installations (not more specialised work).

Assumption: Sufficient numbers of installers/suppliers have the resource to achieve Trustmark and MCS accreditation. The supply chain can identify an ongoing business case for providing retrofit services to justify this investment. This holds true regionally to enable projects in different areas to progress successfully.

Risk: Suppliers choose not to become involved because PAS 2035 adds significant administrative and reporting burden.

Risk: Suppliers choose not to undertake MCS accreditation and to install clean heat measures because this is too much of an additional cost on top of PAS 2035/Trustmark.

Risk: A perceived lack of long-term policy certainty reduces supply chain appetite to invest in accreditation and upskilling.

Wide range of projects undertaken and retrofit techniques/measures used

A diversity of social housing retrofit projects varying in archetype, tenure mix and resident type were undertaken and involved installation of a wide range of retrofit techniques/measures.

Benefits relating to the supply chain and retrofit innovation and value for money

Green jobs supported across England

Installation of energy performance measures in social homes across the English regions leads to an increase in the creation, maintenance and upskilling of both direct and indirect green jobs and apprenticeships amongst retrofit coordinators, installers and manufacturers. This contributes to delivery of the levelling-up agenda. A knock-on effect may occur within the other countries of the UK.

Upskilled and expanded supply chain

The requirement for Trustmark/MCS and PAS certification has driven suppliers to invest in achieving accreditation thereby increasing the overall number of certified installers. The pipeline of work is also expected to have increased capacity and capability amongst retrofit coordinators and manufacturers of required materials. The Wave 1 coordination of different measures to be installed in multiple homes in one location plus the scale of the works provides a valuable opportunity to the supply chain.

Innovation in process and VfM

Whilst Wave 1 did not require innovation or use of new technologies, undertaking large-scale retrofitting inherently spurs some innovation in processes. Enabling innovation (in both process and product) can drive down retrofit costs and improve value for money. The innovation is expected not only in retrofit technologies, but also in relation to procurement and collaboration between actors.

External Factor: Other schemes (Green Homes Grant, energy innovation schemes: SMETER, Heat Pump Ready etcetera) may support the projects through novel technologies and processes, including digitalisation and efficient heat systems.

Reduction in average cost of retrofit measures

Wider implementation of retrofit measures can benefit from economies of scale leading to reduction in the average cost and time of retrofitting.

External factor: High levels of inflation will affect the average cost of retrofit measures.

Wave 1 scheme objectives:

Upskilled and expanded supply chain

SHDF project-based exposure leads to learning and improvement in processes and methods, consequently increasing supply chain capabilities across retrofit coordinators, installers and manufacturers. Positive experience and learning on Wave 1 drive participating suppliers' interest and confidence in expanding capabilities and capacities further. Awareness of positive outcomes and opportunities on Wave 1 by non-participating suppliers develops their interest in upskilling and expanding their capacity for future waves and similar opportunities.

Development of the retrofit sector

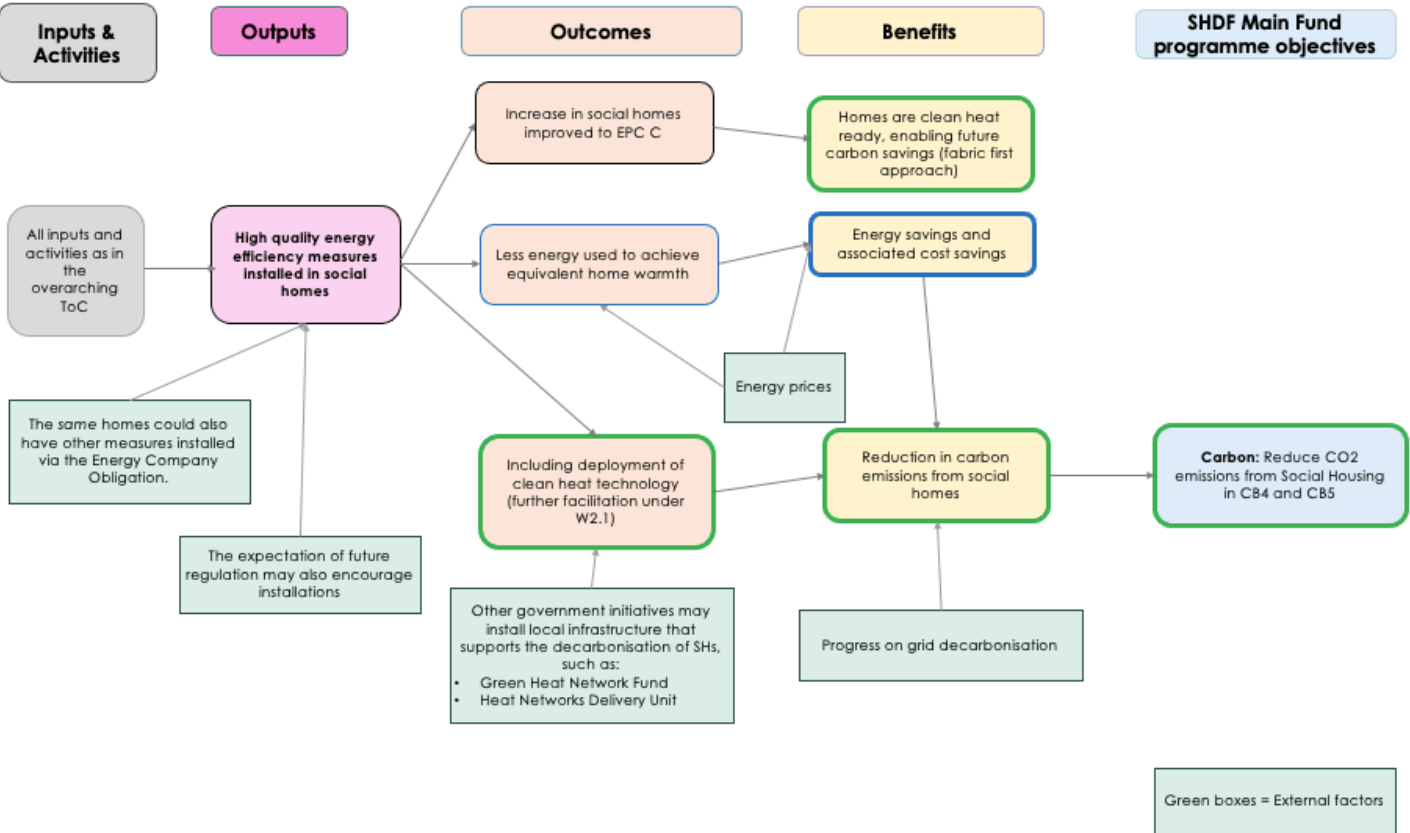
Innovation in retrofit and reduced average cost of measures support wider development of the retrofit sector for the broader benefit of the owner occupier and private rental sector as well as the social housing sector. Knowledge creation and learning from the projects enables replicability and scaling up of innovative retrofitting measures.

External factor: Other government initiatives are also likely to influence the supply chain, development of retrofit sector and VfM. These include: Home Upgrades Grant, Green Homes Grant LADS, Energy Company Obligation, Green Homes Grant Voucher Scheme, PSDS, Green Deal Homes Improvement Fund, Heat Pump Ready, Boiler Upgrade Scheme, Green Heat Network Fund and Heat Network Delivery Unit.

2.5 Pathway to Energy and Carbon Savings

The inputs and activities already described in the previous sections are expected to lead to the installation of high-quality energy performance measures in social homes as the principal output of Wave 1. This next section describes how installation of these measures is intended to lead to environmental benefits in the form of energy and carbon savings ultimately feeding into the overarching objective of the SHDF Main Fund to reduce CO2 emissions from social housing in the fourth and fifth Carbon Budgets (Figure 4).

Figure 5: Pathway to energy and carbon savings



Outputs: The principal output of Wave 1 is to install high-quality energy performance measures in social homes. These measures can include any energy efficiency and heating measures which are compatible with the Standard Assessment Procedure (SAP) 2012. For example, wall, loft and underfloor insulation and heat pumps.

Assumption: Any installations and retrofits are made in line with expectations and are up to standard. Eligible installers must be TrustMark accredited (or equivalent) or MCS accredited (or equivalent) where relevant. Any installations should be in compliance with PAS 2035 specifications for whole-house retrofit. SHLs must adhere to all relevant building safety and construction product regulations and requirements. Upon the completion of works, properties involved are expected to reach at least EPC Band C (or Band D, where this is not possible for properties originally at EPC F or G), with a space heating demand target of 90 kWh/m²/year.

External factor: It is possible that SHLs access other public funding (Home Upgrades Grant or the Green Homes Grant) to install energy performance measures directly or that some measures could also be installed by energy suppliers in social housing via the government ECO schemes. However, it is intended that the main government support scheme used in social housing will be the SHDF Main Fund.

External factor: SHL expectations about the potential for future government regulation of energy standards in social housing or internal SHL desire to contribute to net zero pathways might motivate additional investment outside Wave 1 in energy performance measures either currently or in the near future.

Environmental outcomes

Increase in social homes improved to EPC C

As a result of the installations, social homes are improved to EPC Band C or higher. Where properties were originally at EPC Band F or G and it is not possible to reach EPC Band C, properties must reach Band D upon the completion of works.

Energy savings

The installation of more efficient technologies lead to energy savings. Residents can use less energy to achieve equivalent home warmth.

Assumption: Residents use any new equipment appropriately and effectively and can access instructions or support for this where necessary.

Assumption: SHLs employ sufficient monitoring and evaluation of the measures installed to ensure that any performance issues are identified and addressed. Guidance and advice from TAF and the DP is sufficient to support SHLs where their expertise is limited.

Risk: There is a performance gap whereby the performance of energy efficiency measures is poorer than expected, reducing the energy and carbon savings resulting from the measures.

Risk: There is a rebound effect in which residents increase their energy use because they can now afford to heat their homes to a higher temperature or use other electrical appliances for longer periods due to the cost savings arising from energy efficiency measures. However, this may be unlikely in the current context of high energy prices.

External factor: Energy prices ultimately affect cost savings arising from reduced energy use but change in energy prices may also directly affect resident behaviour in relation to energy use. High energy prices may lead residents to reduce their energy use (with or without energy performance measures).

Deployment of clean heat technology

Energy performance measures include the deployment of clean heat technology.

External factor: Other government initiatives and regulations are also expected to support the deployment of clean heat technology, for example by installing local infrastructure to support decarbonisation of social homes (e.g. the Green Heat Network Fund and the Heat Networks Delivery Unit).

Risk: SHLs may have decided not to install clean heat measures because this can lower rather than improve a property's EPC rating. SHLs may also delay decisions to install clean heat because there is uncertainty about government policy on gas boilers and on use of hydrogen versus electrification of heat.

Risk: SHLs may also face particular reluctance from residents to have clean heat measures installed.

Environmental benefits

Carbon, energy and associated cost savings

Where residents reduce their energy use, this leads to reductions in energy costs. This energy saving also leads to reductions in carbon emissions together additional carbon savings arising from the deployment of clean heat technologies.

Homes are clean heat ready

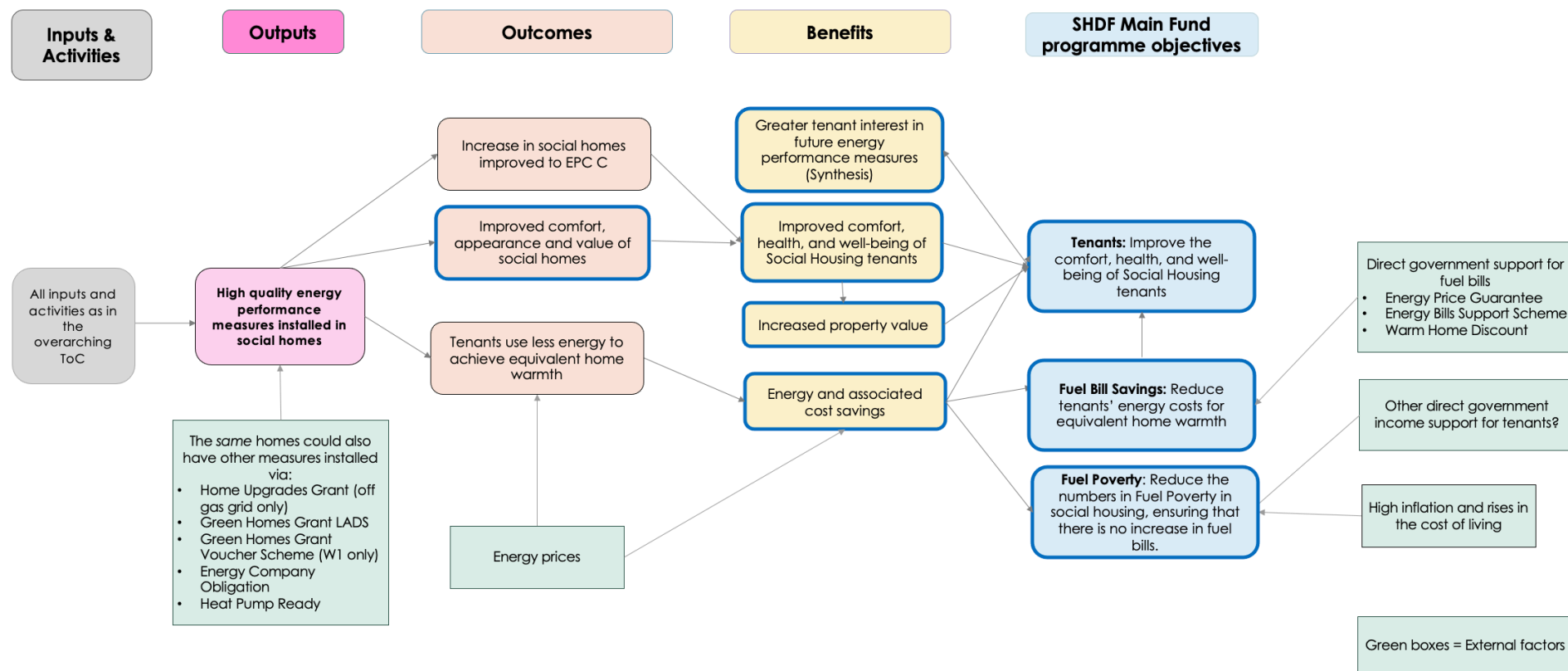
The improvement of social homes to EPC C through a fabric first approach is likely to make homes more suitable for the future installation of clean heat measures.. This unlocks the potential for future additional carbon savings.

External factor: Progress on decarbonisation of the grid will also influence the carbon savings achieved.

2.6 Resident impacts

The inputs and activities already described in the previous sections are expected to lead to the installation of high-quality energy performance measures in social homes as the principal output of Wave 1. This next section describes how installation of these measures is intended to lead to benefits for residents as per the objectives of the SHDF to: improve the comfort, health and wellbeing of social housing residents; reduce residents' energy costs for equivalent home warmth; and, reduce the numbers in fuel poverty in social housing (Figure 5).

Figure 6: Pathway to resident impacts



The inputs and activities already described in the previous sections are expected to lead to the installation of high-quality energy performance measures in social homes as the principal output of Wave 1. This next section describes how installation of these measures is intended to lead to benefits for residents as per the objectives of the SHDF to:

- Improve the comfort, health and wellbeing of social housing residents.
- Reduce residents' energy costs for equivalent home warmth.
- Reduce the numbers in fuel poverty in social housing.

Resident outcomes

Improved comfort, appearance and value of social homes

As a result of the installation of energy performance measures, social homes will be more comfortable and have an improved appearance. Homes could be warmer and less damp with less mould. Installation of insulation leads to improved appearance of the property structure through, for example, newly rendered internal and external walls or new doors, windows or glazing.

Resident benefits

Fuel bill savings and reduced numbers in fuel poverty

Residents using less energy to heat their homes to equivalent warmth results in associated energy and cost savings (noting the assumptions, risks and external factors articulated in the previous section). Lower fuel bills are then expected to reduce the overall number of residents experiencing fuel poverty.

Assumption: Residents of different types including by age, gender, ethnicity and disability (as protected under the Public Sector Equality Duty) are able to benefit equally from installation of measures and arising benefits.

Risk: Residents with protected characteristics are less able to benefit than other residents because, for example, health problems mean they are not able to accommodate the disruption or displacement associated with the installation of energy performance measures.

Assumption: Fuel poverty is being measured by LILEE (Low Income Low Energy Efficiency Indicator) where someone is in fuel poverty if the property EPC is below C AND after heating their home, they are left with a residual income below the official poverty line (60% below median equalised income after housing costs).

External factors: Fuel bills are also expected to be significantly affected by direct government support for fuel bills including the current Energy Price Guarantee, Energy Bills Support Scheme, Warm Home Discount and any other future support. Other direct government income support for social housing residents plus other significant changes to household income (for example, arising from inflation) would also affect their likelihood of experiencing fuel poverty using the LILEE definition.

Improved comfort, health and well-being of social housing residents

The improved comfort and appearance of social homes could lead to physical and mental health benefits from reduced risk of cold-related illnesses, mould or damp related illness and greater mental well-being from pride in place. The improved pride of place could encourage social housing residents to purchase their homes.

Lower fuel bills are also expected to improve the mental well-being of residents, by reducing the stress burden.

Greater resident interest in future energy performance measures

When residents see improved comfort, health and well-being as a result of the energy performance measures installed, it could promote interest in further energy efficiency or low carbon heating measures. The same could occur when non-participating residents see the improvements being made to other properties.

Assumption: Benefits are visibly apparent to non-participating residents or are communicated and disseminated sufficiently by residents, SHLs and/or government.

3 Detailed Evaluation Questions

Table 1: Evaluation questions and sub-questions and where they are covered in the Process Evaluation Report

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
1	How effectively have the SHDF Wave 1 programmes been implemented and delivered?	
1.1	What were the drivers and barriers to successful SHL applications to Wave 1?	Chapter 3: Design and application process
1.2	How effective and timely was the marketing of Wave 1, including SHRA activity, in successfully reaching and engaging SHLs?	Chapter 3: Design and application process
1.3	How effective was Wave 1 support, including SHRA, in enabling SHLs to make successful funding applications? Including in: <ul style="list-style-type: none"> Supporting applicants to form consortia to add value to bids. 	Chapter 3: Design and application process

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
	<ul style="list-style-type: none"> Supporting SHLs to develop appropriate, cost-effective plans for improving the energy efficiency of their stock in their bid. Providing SHLs with information and guidance needed to prepare effective bids. 	
1.4	To what extent did the number, scale and profile of successful bids for Wave 1 reflect the scale and profile of outcomes the scheme is intended to achieve? To what extent, did the application and assessment process support this?	Chapter 3: Design and application process
1.5	<p>How effectively has project delivery and performance been managed in Wave 1? Including in terms of:</p> <ul style="list-style-type: none"> The ongoing monitoring of project performance Use of the change control process Use of the clawback process Scheme governance Risk management 	Chapter 4: Delivery
1.6	To what extent has the Scheme Administrator (DP) fulfilled the requirements outlined in the Delivery Model Assessments for Wave 1? Why/why not?	Chapter 4: Delivery
1.7	Question omitted (relevant for SHDF Wave 2.1 evaluation only)	Relevant for SHDF Wave 2.1 evaluation only
1.8	<p>How effective was Wave 1, including the DP, in providing ongoing support to SHLs to enable successful project delivery? Including in terms of:</p> <ul style="list-style-type: none"> Supporting procurement and management of contractors Supporting interaction with other stakeholders such as DNOs and planning authorities Supporting cross-learning from other SHDF projects, HUG and other government energy efficiency schemes 	Chapter 4: Delivery Chapter 5: Developing and managing the supply chain

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
1.9	<p>How effective was Wave 1 in analysing and engaging with the supply chain to enable successful project delivery? Including in terms of:</p> <ul style="list-style-type: none"> • Making the case for upskilling and increasing capacity in the supply chain to deliver Wave 1 • Identifying and minimising potential supply chain disruptions to project delivery • Feeding into and benefitting from wider DESNZ supply chain analysis and engagement 	Chapter 5: Developing and managing the supply chain
1.10	<p>How effective was Wave 1 support for post measure installation activity to support realisation of benefits, including supporting SHLs to advise and guide residents as needed to use any new equipment appropriately and effectively?</p>	Will be answered in Wave 1 Impact Evaluation Report
1.11	<p>How efficiently have Wave 1 been managed including in terms of application and scheme management and support processes and the appointed sub-contractors delivering these functions?</p>	Chapter 3: Design and application process Chapter 4: Delivery
2	To what extent and how have Wave 1 projects performed as intended?	
2.1	<p>Have Wave 1 projects delivered:</p> <ul style="list-style-type: none"> • At the intended scale? • On time? • Cost effectively? • Installations of high quality? • Positive resident experience of and satisfaction with the installation process? • In line with the fabric first approach? • In line with the 'lowest regrets' approach? • As originally intended? • Why/why not? 	Chapter 4: Delivery

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
2.2	What variation has there been in project delivery in Wave 1? For example, by retrofit measure, archetype, tenure type, region, project lead/consortia type, resident profile.	Chapter 4: Delivery
2.3	What have been the critical success factors for and barriers to project performance in Wave 1? Including in relation to: <ul style="list-style-type: none"> • Resident engagement (including those at risk of fuel poverty) • Supply chain procurement and management • Cost and risk management 	Chapter 4: Delivery
2.4	How have external factors influenced project success in Wave 1? Including: <ul style="list-style-type: none"> • Covid • High inflation • Brexit 	Chapter 4: Delivery
2.5	What, if any, other sources of support and guidance are SHLs using other than that provided through SHDF?	
3	To what extent and how have Wave 1 incorporated lessons learned from other DESNZ energy efficiency schemes and the SHDF(D) to inform the design and delivery of waves?	
3.1	How effectively have learnings from the SHDF(D) been incorporated into the design and/or delivery of Waves 1?	Chapter 3: Design and application process
3.2	How effectively are learnings being collated and used to adjust delivery within and for future SHDF waves? Including to new emerging risks or opportunities?	Chapter 4: Delivery
3.3	Have projects in Wave 1 successfully validated evidence and learning about the deliverability of retrofit at scale, and how? To what extent and how has this been shared within and outside of Wave 1?	Chapter 4: Delivery

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
4	To what extent and how was the design of Wave 1 effectively supported both wave-level and overall SHDF achievements?	
4.1	Requirements for prioritisation of measures and/or properties including: the 'Worst first, fabric first, no regrets' criteria, minimum proportion of properties starting with an EPC lower than C, improving properties to EPC C (except where they started at F/G), cost cap structure. Did this lead to improved targeting of measures?	Chapter 3: Design and application process
4.2	PAS 2035 quality requirements for installations and use of Trustmark (or equivalent) certified installers (and MSC or equivalent for low carbon heating). To what extent did this contribute to achieve high-quality installations? To what extent did PAS 2035 requirements influence the ability of SHLs to retrofit at scale?	Chapter 4: Delivery Chapter 5: Developing and managing the supply chain
4.3	Requirements regarding facilitation of low carbon heating?	Chapter 3: Design and application process
4.4	Eligible applicant type (restricted to consortia led by LAs in Wave 1)?	Chapter 3: Design and application process
4.5	Delivery period (12 months for Wave 1)?	Chapter 3: Design and application process
4.6	Minimum level of co-funding (33% in Wave 1)?	Chapter 3: Design and application process
4.7	Infill tenure policy. To what extent and how has this been an enabler or barrier to achieving Wave aims?	Chapter 3: Design and application process
4.8	Proportion of funding that can be allocated to administration and ancillary costs. Was this appropriate?	Chapter 3: Design and application process
4.9	Question omitted (relevant for SHDF Wave 2.1 evaluation only)	Relevant for SHDF Wave 2.1 evaluation only

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
5	To what extent, and how, have Wave 1 delivered benefits for social housing residents, including delivering warm, energy-efficient homes, improved resident health and wellbeing outcomes, and reduced risk of fuel poverty?	
5.1	To what extent have residents been satisfied with the energy performance measures installed?	Chapter 7: Early resident benefits
5.2	To what extent, and how, have Wave 1 contributed to delivering more comfortable homes for residents? Including in terms of warmth and aesthetic appearance.	Chapter 7: Early resident benefits
5.3	To what extent, and how, have Wave 1 contributed to reducing the risk of fuel poverty amongst scheme beneficiaries? How important has this been in comparison to other government initiatives such as the Energy Price Guarantee and Energy Bills Support Scheme?	Will be answered in Wave 1 Impact Evaluation Report
5.4	To what extent, and how, has Wave 1 contributed to change in resident physical health including, for example, through reducing the incidence of cold home related physical illness and dangers arising from lower temperatures such as damp and mould?	Chapter 7: Early resident benefits
5.5	To what extent, and how, has Wave 1 contributed to change in resident mental health and wellbeing?	Chapter 7: Early resident benefits
5.6	To what extent, and how, has Wave 1 contributed to change in residents' interest in future energy efficiency or low carbon heating works?	Chapter 7: Early resident benefits
5.7	To what extent, and how, has Wave 1 contributed to change in residents' behaviours and attitudes in relation to energy use?	Chapter 7: Early resident benefits
5.8	How have these impacts varied by resident type including by household composition, those at risk of fuel poverty, incidence of disability and ill-health, age, gender and	Chapter 7: Early resident benefits

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
	ethnicity? How have these impacts varied by measure mix/installation type?	
5.9	To what extent has Wave 1 contributed towards the above benefits over and above other government (or internally SHL funded) initiatives to support the energy performance of social housing?	Will be answered in Wave 1 Impact Evaluation Report
6	To what extent, and how, have Wave 1 improved social housing landlords' capacity and capability to decarbonise their housing stock?	
6.1	How many of the energy performance improvements funded by Wave 1 would SHLs have undertaken without DESNZ funding to the same timescale? Would more improvements have been made over a longer timescale? Would these have been undertaken to the same quality?	Chapter 3: Design and application process
6.2	<p>What skills and resources have SHLs developed through participation in Wave 1? How have these been developed? Including in terms of:</p> <ul style="list-style-type: none"> • Awareness and knowledge about a. the energy performance of their housing stock and b. energy performance measures to decarbonise their housing stock. • Confidence in and ability to procure and deliver energy performance installations. • Ability to produce high-quality applications for future government funded retrofit schemes. 	Will be answered in Wave 1 Impact Evaluation Report
6.3	To what extent and how, has participation in Wave 1 and Wave 2.1 contributed to increasing the size, scale or quality of SHLs' future plans for decarbonisation of their stock?	Will be answered in Wave 1 Impact Evaluation Report
6.4	How have these impacts varied by SHL type including by type of organisation, size of stock and nature of stock?	Will be answered in Wave 1 Impact Evaluation Report

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
6.5	What interaction has there been between SHL participation and capability and capacity development through SHDF and other initiatives or private investment?	Will be answered in Wave 1 Impact Evaluation Report
6.6	To what extent, and how, have Wave 1 and Wave 2.1 contributed to improving the financial value of social housing?	Will be answered in Wave 1 Impact Evaluation Report
7	How effectively have Wave 1 delivered intended environmental and cost benefits, specifically energy, carbon and bill savings?	
7.1	How many social homes have had upgraded EPCs including specifically to EPC C due to installation of energy performance measures in Wave 1?	Chapter 4: Delivery
7.2	What energy savings have been generated by the installation of energy efficiency measures in Wave 1?	Will be answered in Wave 1 Impact Evaluation Report
7.3	To what extent has the installation of energy performance measures in Wave 1 delivered a reduction in fuel bills?	Will be answered in Wave 1 Impact Evaluation Report
7.4	What carbon emission reductions has the installation of energy performance measures in Wave 1? What role has the installation of clean heat measures played in this?	Will be answered in Wave 1 Impact Evaluation Report
7.5	How have these impacts varied by building archetype and/or measure mix?	Will be answered in Wave 1 Impact Evaluation Report
7.6	To what extent has the installation of energy performance measures prepared the fabric of social homes so that it is suitable for future clean heat installations (thereby potentially delivering further energy and carbon savings)?	Will be answered in Wave 1 Impact Evaluation Report

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
7.7	To what extent are anticipated future changes, such as regulation of the energy performance of social housing, likely to reduce the necessity and/or impact of Wave 1 outcomes?	Will be answered in Wave 1 Impact Evaluation Report
8	To what extent and how did Wave 1 deliver retrofit installations which were high quality and represent good value for money for DESNZ?	
8.1	To what extent and how, has Wave 1 contributed to greater value for money for a. DESNZ and b. in the retrofit sector through economies of scale? Including via future cost reductions in retrofit improvements due to efficiency gains and technical improvements? To what extent has the rate of observed cost reductions, e.g. in the average cost of retrofit per home, if any, changed across Wave 1?	Chapter 4: Delivery Chapter 5: Developing and managing the supply chain
8.2	What variation has there been in installation costs and value for money for a. different types of installations and measure mixes b. in different archetypes and c. in different regions?	Chapter 4: Delivery
8.3	To what extent have SHLs used SHDF funding to target hardest-to-treat stock and how has this affected value for money in Wave 1?	Will be answered in Wave 1 Impact Evaluation Report
8.4	To what extent and how, did Wave 1 lead to innovation in the products or methods used in retrofit?	Chapter 5: Developing and managing the supply chain
8.5	To what extent and how has innovation contributed to improvement in value for money?	Will be answered in Wave 1 Impact Evaluation Report
8.6	Question omitted (relevant for SHDF Wave 2.1 evaluation only)	Relevant for SHDF Wave 2.1 evaluation only

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
8.7	Question omitted (relevant for SHDF Wave 2.1 evaluation only)	Relevant for SHDF Wave 2.1 evaluation only
8.8	Question omitted (relevant for SHDF Wave 2.1 evaluation only)	Relevant for SHDF Wave 2.1 evaluation only
8.9	To what extent, and how, has Wave 1 contributed to improvements in building standards and safety?	Will be answered in Wave 1 Impact Evaluation Report
8.10	To what extent, and how, has Wave 1 contributed to any unintended or negative impacts? Including for residents, SHLs, the supply chain, government and/or wider society.	Will be answered in Wave 1 Impact Evaluation Report
9	To what extent and how has Wave 1 contributed towards intended wider impacts, including supporting the green economy and supply chain for retrofitting social housing?	
9.1	To what extent and how, has Wave 1 contributed to upskilling in the supply chain? Including increased levels of Trustmark & MCS certification amongst installers and greater experience of and confidence in installing to PAS 2035 quality standards.	Will be answered in Wave 1 Impact Evaluation Report
9.2	To what extent and how, has Wave 1 contributed to building capacity in the supply chain? Including number of companies and jobs and apprenticeships sustained or created across England amongst retrofit coordinators, installers, and manufacturers.	Will be answered in Wave 1 Impact Evaluation Report
9.3	What barriers still exist to the capability and capacity of the supply chain to deliver the decarbonisation of social housing?	Will be answered in Wave 1 Impact Evaluation Report

Evaluation questions and sub-questions		Chapter of Process Evaluation Report
9.4	How well has use of the supply chain been coordinated with other DESNZ energy efficiency schemes?	Will be answered in Wave 1 Impact Evaluation Report
9.5	To what extent has Wave 1 contributed towards supporting an increased supply chain over and above other government (or external) initiatives?	Will be answered in Wave 1 Impact Evaluation Report

4 Primary fieldwork

4.1 Resident survey

Resident survey overview

A total of 1,498 residents across 45 projects, who had agreed to have energy saving measures installed in their home under Wave 1, took part in the ‘during installation’ resident survey. The survey was split in three tranches, to account for different installation times across Wave 1 properties. At the time of the survey, most residents had at least some of their installation work started, with some having had their works recently completed. The survey captured key demographic and property characteristics, types of measures installed, residents’ views and experience of heating their home, issues experienced in their home prior to installation, the installation process, their motivations for agreeing to having measures installed, and early outcomes of installations. Respondents could complete the survey online or via telephone.

Resident survey sample

The original target was to achieve 2,000 survey responses. Because of the limited available sample frame, a census approach was taken for Wave 1 participating residents. In total, 5,235 residents were invited to take part in the ‘during installation’ survey, representing 49 projects.

Resident survey fieldwork

As the start and completion dates of Wave 1 projects varied, the survey was disseminated in three tranches (tranche 1: May and June 2023, tranche 2: July and August 2023, tranche 3: January and February 2024).

All eligible residents were sent an invitation letter by post to take part in a 10-to-15-minute online survey via a unique link or QR code. Residents that did not respond following the invitation letter were sent reminder letters or emails (when an email address was known) and

contacted by telephone and offered the option to complete the survey over the phone with an interviewer. Respondents received a £10 e-voucher or a physical shopping voucher as a thank you for taking part.

A 'follow-up' survey will occur in early 2025, once all residents are expected to have experienced at least one full winter season after the installation of measures. The findings from this 'follow-up' survey will be used to inform the impact evaluation.

In total, 1,498 residents covering 45 projects completed the 'during installation' survey (29% response rate), 59% via telephone and 41% online.⁵ This resulted in a maximum error margin of +/-2.4% at the 95% confidence level.

Resident survey questionnaire

The resident survey covered the following topics:

- Awareness of energy saving measures
- Property profile
- Installation status
- Heating status
- Issues experienced in home before the installation of energy saving measures
- Motivations to receive energy saving measures
- Installation process
- Confidence using energy saving measures
- Outcomes following the installation of energy saving measures
- Views on receiving further energy saving measures in the future
- Demographic questions about household

Table 14 in Chapter 7 outlines individual survey questions and the evaluation questions addressed. Small amends were made between the three tranches to improve the quality of the data collected (following feedback collected via residents during telephone interviews).

Weighting adjustments

We applied a post-stratification weighting adjustment to help make the characteristics of the respondents taking part in the survey as close as possible to the profile of the population of residents receiving installation measures (based on our understanding from the Wave 1 management information (MI) data). This aims to reduce potential bias in the survey estimates towards the experiences and attitudes of those more likely to participate in the survey.

The profile of the respondents could differ from the population of residents taking part in the scheme partly due to the design of the sample (more detailed provided below) and partly as a

⁵ 280 residents responded in tranche 1, 289 in tranche 2 and 929 in tranche 3.

result of non-response (i.e. when the characteristics of the respondents differ from the non-respondents in ways that are associated with the data that we are capturing in the survey).⁶

In terms of sample design, the survey was conducted in tranches using available sample from projects that had submitted resident contact details to DESNZ. The submission of these resident details did not proceed at an even pace across all the regions involved in the scheme. In particular, a large volume of sample was provided from the North East region for tranche 1 of the survey. As a result, we achieved more interviews with residents in this region than would be necessary to be representative of the national distribution of the scheme.

When considering non-response, we would typically look at the characteristics of the survey respondents against key socio-demographic indicators for the population such as age and sex. However, the scheme MI data did not include socio-demographic information on residents who received measures against which to compare our survey respondents.

We examined the possibility of using the characteristics of all social rented sector residents living in homes with EPC D or below (taking part in the English Housing Survey, EHS) as a population frame against which to adjust the SHDF data. However, we concluded that we cannot say with any confidence that Wave 1 residents resemble the profile of all social residents. Given the known characteristics of the SHLs taking part in Wave 1, the nature of their stock and the types of properties selected for measures (SHLs purposively selected which of their properties would receive measures), we would not expect their residents to be representative of the whole social rented sector. There are also differences in measurement between the two surveys: the EHS reports the gender of the *householder*, who in the case of joint residents is selected on the basis of their employment status and income, whereas respondents to the resident survey for the Wave 1 evaluation could be either of the joint residents.

We also assessed whether a resident's title in the contact details provided by SHLs could be used as a proxy indicator of sex. Although about 20% of resident records were missing a title, the estimated proportions of residents by sex among those for whom a title was given was very close to our survey respondents, indicating no post-stratification adjustment was needed to be made.

Instead, we found two scheme related indicators available from the MI data where the survey sample differed from the total population of residents in Wave 1, as well as region. These were:

- The type of property (whether a flat, house or bungalow) – with a slight under-representation of residents living in bungalows among those who responded; and
- The number of properties being retrofitted in the project that the resident's property was part of - with a slight over-representation of residents in the smallest projects (defined as those with less than 100 properties to treat).

⁶ See Bethlehem, J. (2009) Applied Survey Methods: A Statistical Perspective. New York: Wiley for further discussion of the rationale for and approaches to weighting survey data.

In total, therefore, each survey respondent was assigned an adjustment according to their region, type of property and project size to make the final weighted sample more representative of all properties in Wave 1.

Table 2 shows the distribution of the weighting adjustment variable that was created using the Random Iterative Method (RIM) weighting approach.⁷ A high proportion (60%) of the survey sample were assigned a weight less than 0.1. These tended to be residents in the North East whose projects had a high likelihood of being included in the survey sample. After making the weighting adjustment, the 'effective sample size' was reduced considerably (n=1,007).

A small proportion of the sample were assigned weights between 3 and 4 indicating that they were in an under-represented region, property type and scheme size. Although large weighting adjustments can reduce bias in our estimates, they also reduce the precision of the estimates considerably, meaning the confidence interval around these estimates becomes very large. As is commonly practiced in survey analysis, we therefore trimmed any weights greater than 3 back to 3.

Table 2: Distribution of Wave 1 weight variable

Weight value	Number of records	Proportion of all records
0 to <0.5	484	32.3%
0.5 to <1	417	27.8%
1 to <1.5	260	17.4%
1.5 to <2	173	11.5%
2 to <3	11	7.9%
3	46	3.1%
Total	1498	100%

⁷ This is an iterative procedure to create a single numerical weight for each respondent from a group of variables in a statistically efficient way. For a discussion of the approach see Sharot, T. (1986) 'Weighting survey results'. *Journal of the Market Research Society*, 28 (3), pg. 269-284.

Resident survey data production and analysis

A set of unweighted and weighted aggregated Excel data tables, and a clean CSV anonymised dataset with raw data, were provided to DESNZ. Relevant sub-groups were included as cross-breaks to the tables along with significance testing. Cross-breaks in the data tables include project variables, such as region, dwelling type and measures installed, as well as resident demographic variables e.g. age, gender and ethnicity and other key survey variables such as resident health conditions, satisfaction with installation process, and problems experienced in the home prior to installation.

Only findings with a base of 50 or more respondents were reported. Differences between and within sub-groups were only highlighted within the report if they were statistically significant at the 95 percent confidence level, unless otherwise stated, i.e. statistically we can be 95% confident that the differences are 'real' differences and not due to chance.

Unweighted and weighted demographic profile of resident survey

Table 3: Unweighted and weighted gender profile of resident survey

Gender	Unweighted base	%	Weighted base	%
Male	443	30%	425	29%
Female	973	65%	973	65%
Prefer not to say / missing	82	5%	89	6%
Total	1,498	100%	1,487	100%

Table 4: Unweighted and weighted age profile of resident survey

Age	Unweighted base	%	Weighted base	%
18-34	129	9%	143	9.6
35-54	440	29%	464	31.2
55-74	656	44%	638	42.8
75+	204	14%	165	11.1
Prefer not to say / Missing	67	5%	78	5.3

Age	Unweighted base	%	Weighted base	%
Total	1,498	100%	1,487	100%

Table 5: Unweighted and weighted ethnicity profile of resident survey

Ethnicity	Unweighted base	%	Weighted base	%
Asian/Asian British	32	2%	41	3%
Black/African/Caribbean/Black British	52	3%	77	5%
Mixed/Multiple ethnic groups	35	2%	50	3%
White	1345	90%	1281	86%
Other ethnic group	11	1%	15	1%
Prefer not to say / Missing	23	2%	23	2%
Total	1,498	100%	1,487	100%

Table 6: Unweighted and weighted disability profile of resident survey

Disability	Unweighted base	%	Weighted base	%
Yes, limits activities all of the time	549	37%	526	35%
Yes, limits activities some of the time	337	22%	323	22%
Yes, but does not limit activities	96	6%	99	7%
No	428	29%	451	30%
Prefer not to say / Don't know / Missing	88	6%	88	6%

Disability	Unweighted base	%	Weighted base	%
Total	1,498	100%	1,487	100%

Table 7: Unweighted and weighted working status profile of resident survey

Working status	Unweighted base	%	Weighted base	%
Full-time paid work	293	20%	314	21%
Part-time paid work	191	13%	193	13%
Long term sick leave	139	9%	144	10%
School or education	7	0%	6	0%
Unemployed / Not in paid employment / Maternity, paternity or parental leave	365	24%	342	23%
Retired	388	26%	364	25%
Prefer not to say / Don't know / Missing	115	8%	124	8%
Total	1,498	100%	1,487	100%

Resident survey limitations

Key limitations of the resident survey, and the efforts taken to mitigate these, are listed below:

- The volume of contact details for Wave 1 residents supplied to the evaluation team was lower than anticipated, which led to a lower achieved sample size than planned (1,498 compared to a target of 2,000). This reduced the statistical robustness of the survey (our maximum error margin was +/-2.4% compared to +/-2.0% had we obtained 2,000 responses).
- Furthermore, 20 of the 65 projects were not represented in the resident survey (due to them not supplying data in time for fieldwork), while other projects were under-represented relative to the number of properties they retrofitted. This meant that our achieved sample was unlikely to be representative of the Wave 1 population. There

may be a difference in the nature of delivery (and therefore resident experience) between projects who supplied data and those who did not, although the extent and nature of this difference is unknown. We applied weighting to the survey data to mitigate this issue.

- There can be a bias related to people who are willing and able to respond to surveys of this kind. For example, less digitally literate individuals may be less likely to complete online surveys. To mitigate this, the survey was hosted both online and over the telephone, residents were invited via postal invite, email and telephone (where possible), and a £10 incentive was offered to all those who completed. Non-response weighting also helped reduce this bias.
- Other considerations to take into account when designing the research were the long period over which works were carried out, and the timeliness of receipt of resident property, measure and contact details from SHLs. Because of the different delivery timelines across projects, some works may have been ongoing, making it difficult to capture immediate impacts through the resident survey. Conversely, in some cases, works had begun or completed sometime before the survey, meaning details about the initial stages of the installation may have been harder for residents to recall. To mitigate this, the survey was administered in tranches. This enabled us to reach most residents either during or shortly after their installation completed, thereby reducing the risk of recall issues. However, some projects supplied delivery data several months after installations completed, and as a result their residents were surveyed much later than others, increasing the risk of recall bias.
- The different timings of installation dates and the survey mean that:
 - Firstly, some residents' experiences and responses may have been affected by the time of year of both the installation and survey (for example, those answering in Winter might report about their thermal comfort differently compared to if they were answering in Summer; similarly, those surveyed in earlier tranches might have been more adversely affected by high inflation rates and the associated cost of living crisis);
 - Secondly, residents that were surveyed sometime after the installation may have experienced more benefits than those with works ongoing or recently completed at the time of the survey. Although the analysis in the report does not distinguish between residents based on the timing of their installation, analysis of emerging resident outcomes focusses only on residents whose installations were completed at the time of the survey.
- Some questions were only asked in tranches 2 and 3 of the survey, following feedback from the first tranche (such as those covering new issues experienced in the home following installation, and the question on health outcomes with revised response options). These questions therefore returned a smaller base, slightly reducing their statistical robustness. This also means that residents who had installations undertaken earlier in Wave 1 delivery were less likely to answer these questions.

4.2 Resident interviews

Resident interviews overview

Qualitative in-depth interviews were carried out with 150 individuals who had completed the participant resident survey for Wave 1 of the SHDF and agreed to take part in a follow-up interview. These interviews took place in three tranches, shortly after the equivalent tranche of the resident survey.

Interviews were conducted via Teams, Zoom or telephone with each lasting approximately 45 minutes. Respondents received a £40 e-voucher or a physical shopping voucher as a thank you for taking part.

Resident interviews sample

Interviewees were drawn from the pool of individuals who completed the participating resident survey for each tranche and consented to take part in a follow-up interview. When selecting individuals for interviews, the following aspects were taken into account:

- Case study projects⁸ were prioritised where possible to enable a sufficient level of resident insights to be gathered within each of these.
 - Several residents from Durham and Coventry responded to the survey in tranches 1 and 2, enabling us to complete 25 and 7 interviews with residents from these projects respectively.
 - At tranche 3, the sample was too small to reach a robust number of interviews in each remaining case study (London Borough of Waltham Forest, Norwich City Council, Crawley Borough Council and Liverpool City Region Combined Authority). Other sample characteristics, listed below, were therefore prioritised, including hard-to-treat and broader property and resident characteristics, to select residents for interviews.
- At tranche 3, a target of 15-20 hard-to-treat homes was set to gather further evidence on these. These were homes meeting some or all of the following criteria:
 - Properties with EPC F and G pre-installation rating.
 - Homes not heated by mains gas.
 - Bungalows or flats.
 - Homes built in 1980 or earlier.
- Recruiters also aimed to get a spread of interviews by: type of measure(s) installed; heating type; property type/size/age; resident characteristics including age, gender, ethnicity and disability status.

⁸ More information on the case study approach is contained within Chapter 1.

- Recruiters also aimed to speak to both residents who were satisfied and dissatisfied with the works conducted.

IFF's recruitment executive team contacted individuals initially by phone to encourage participation and secure a date and time for interview.

Resident interviews fieldwork

Fieldwork for the 150 interviews took place across 3 tranches (tranche 1: July 2023, tranche 2: September and October 2023 and tranche 3: between January and March 2024). Most interviews (102) took place in tranche 3 due to the smaller volume of resident survey responses in the previous two equivalent tranches.⁹

Resident interviews topic guide

The aim of resident interviews was to provide further context and detail to the responses from the resident survey. The topic guide covered the following broad topics:

- Information about household
- Initial approach and communication about SHDF Wave 1
- Motivations to receive energy saving measures
- Installation process
- Outcomes after the installation of energy saving measures
- Satisfaction with and understanding of energy saving measures
- Awareness of decarbonisation and SHDF
- Attitudes towards energy saving measures

Table 15 in Chapter 7 outlines individual interview questions and the evaluation questions the guide addressed. After tranche 1, the topic guide was amended to improve the flow and ensure that higher priority sections were asked sooner in the guide. However, the main focus of the guide did not change.

Resident interviews analysis

With consent, resident interviews were recorded, and detailed interview notes produced. For analysis, interview notes were entered into an analysis framework, organised by topic. They were then coded in more detail to bring out emergent themes. An initial coding structure was developed, and inductive coding was used within topics to respond to the specific points raised in interviews. This was then used to produce summary thematic analysis against the key evaluation questions, including verbatim quotes to provide more illustrative detail to themes.

Resident interviews limitations

Some limitations of the resident interviews, and the efforts taken to mitigate these, are listed below:

⁹ 39 interviews took place in tranche 1 and 9 in tranche 2.

- Residents interviewed self-selected to respond to the resident survey and take part in a follow-up interview, and were therefore more likely to be and to represent 'engaged' residents who are willing to take part in voluntary research. We initially aimed to address this bias for the survey sample by offering an incentive, inviting respondents via letter, and conducting telephone chasing. We also offered an incentive for participation in the follow-up interviews.
- Issues relating to sample data provision, and the timing of the data collection as outlined in the '[Resident survey limitations](#)' section also applied to the resident interviews.
- Of particular note is that – as shown above – the evaluation struggled to obtain interviews with residents from most case study projects. This affected the representativeness of findings from resident interviews within each case study, limiting the range of experiences and outcomes covered by the case studies.

4.3 Qualitative interviews with supply chain stakeholders

Supply chain stakeholder interviews overview

Qualitative in-depth interviews were carried out with 39 supply chain stakeholders who were involved in the installation of energy efficiency measures for Wave 1 of the SHDF. Interviews were conducted via Teams or phone, each lasting between 35 and 80 minutes. All respondents were offered £50 (via PayPal, Wise or as a charity donation) as a thank you for their time.

Supply chain stakeholder interviews sampling

Interviewees were selected based on project-based case studies (information about case studies is included in [Chapter 1.3 \(Case study approach\)](#)). However, owing to low sample availability, scope was widened to include supply chain stakeholders from thematic case studies as well as not from case studies. Of the 39 interviews completed, 10 were with supply chain stakeholders who worked on projects that were selected as case studies, two were from a thematic (hard-to-treat) case study and the remaining 27 were not case study specific.

Selected case study projects covered a mix of: measures installed; building archetypes; regions; companies employed as principal contractors and retrofit coordinators; and whether the retrofit coordinator was employed in-house or not. This ensured a varied range of supply chain stakeholders, with a range of experiences, were interviewed.

A mixture of the following sources or methods were used to generate contacts for participation:

- Contacts provided by Wave 1 projects as part of their monthly MI data submissions, filtered by those that belonged to selected case studies.
- Using snowballing techniques with these initial contacts to determine the identities and contacts of other stakeholders and organisations involved in the installation process.

- Asking SHLs that took part in interviews to provide contact details of supply chain stakeholders who worked on their projects.
- When contact details were inaccurate or missing in the MI data, desk research was undertaken by searching company names that participated in the scheme.
- Using the EPC certificate checker website (to obtain assessor details) and the Trustmark register of accredited businesses who took part in the research.

Overall, 302 installation stakeholder contacts were collated (80 from project-based case studies, 41 from projects feeding into the thematic case study on hard-to-treat properties, and 181 from non-case study projects). Across two tranches, 39 interviews were conducted resulting in a 12.6% response rate overall.

Supply chain stakeholder interviews topic guide

Supply chain stakeholders were categorised into four main groups to assist with topic guide design and data analysis, as shown in Table 8.

Table 8: Supply chain stakeholder job roles and descriptions

Supply chain stakeholder role	Description
Person/team installing measures	Usually a sub-contractor to the lead contractor, potentially freelance or small company, potentially directly employed by lead contractor organisation or even in-house. Often several for each project.
Manager of installation teams	Person managing the team installing measures within a project. Most likely a site manager at a lead contractor, potentially could be employed in-house, or could be acting as a sub-contractor to an organisation managing multiple sites. May manage on one or multiple sites within the project.
Senior managers at principal contractors	Managing the resourcing and planning of installations. Can be an installation company director, HR manager / chief at a lead contractor, can be a consultant, can be employed in-house.
Retrofit coordinators	Bringing together / sourcing teams installing different measures. May sit at a consultant level or in-house.

The topic guide drew on the ToC, contribution claims and evaluation questions. Four overall objectives for the evaluation’s research on supply chain stakeholders were created:

1. How do the installation stakeholders view installations as part of Wave 1 in terms of: attractiveness of the work compared to other potential jobs; need for the work in the properties; quality of installations; efficiency of staffing, materials, and resources used;

adequate timescale to carry out works; and value for money? Could any of these be improved?

2. To what extent did external factors affect the delivery of the installations?
3. How do the installation stakeholders feel the certification requirements (PAS 2035, Trustmark, and MCS certification) of participating in Wave 1 activities impacted the installation process in terms of cost, resourcing, quality, and timeliness?
4. How has Wave 1, and the anticipation of future government SHDF waves, impacted the installation stakeholders' decision-making in terms of business growth, energy focused business diversification, upskilling the workforce, and obtaining accreditations?

Owing to the diverse roles involved throughout the installation process, each supply chain stakeholder had a different understanding of the information required to answer the relevant evaluation questions. The relevance of specific roles in addressing relevant evaluation questions was mapped in advance of interviewing, based on desk research and experience on previous research with this audience, as shown in Table 9.

Table 9: Supply chain stakeholder objectives mapped to job roles

Objectives	Person/team installing team(s)	Manager of installation/assessor team(s)	Senior managers at principal contractors	Retrofit coordinators
1	Fully relevant	Fully relevant	Partly relevant	Partly relevant
2	Partly relevant	Fully relevant	Fully relevant	Partly relevant
3	Partly relevant	Fully relevant	Fully relevant	Partly relevant
4	Partly relevant	Fully relevant	Fully relevant	Partly relevant

The topic guide was constructed building on the objectives outlined above, on the roles of supply chain stakeholders involved in installations, and on evaluation questions. Table 10 below shows the range of interview questions mapped against the relevant audience and objectives. For tranche 1, specific questions were only asked to the relevant audience. For tranche 2, some questions intended for installers were also asked to retrofit co-ordinators and senior managers, to ensure sufficient insight was captured (despite the small number of installers taking part in interviews).

The topic guide covered the following broad topics:

- Background on role and responsibilities within their own business
- Understanding of SHDF and reasons for involvement

- Activities being conducted as part of SHDF
- Communications with SHL
- Challenges and barriers to delivery of installations
- Perceived quality of work
- Capacity, training and accreditation
- Value for money of installations
- External factors affecting installations
- Realisation of project benefits
- Broader view on government schemes and support options

Table 17 in Chapter 7 outlines individual interview questions and the evaluation questions the guide addressed.

Supply chain stakeholder interviews fieldwork

Fieldwork for the 39 interviews took place across 2 tranches (tranche 1: between July and September 2023 and tranche 2: between September 2023 and February 2024). Table 10 and Table 11 show the distribution of the 39 interviews by case study project and job role.

Table 10: Supply chain stakeholder interviews by case study project

Case Study Type	Number of completed interviews
Durham County Council	2
Coventry City Council	5
Norwich City Council	1
London Borough of Waltham Forest	2
Hard-to-treat case study	2
Non-Case Study	27
Total	39

Table 11: Supply chain stakeholder interviews by interviewee role

Job role	Number of completed interviews
Person / team installing measures	4
Manager of installation teams	13

Senior managers at principal contractors	16
Retrofit coordinators	6
Total	39

Supply chain stakeholder interviews analysis

With consent, supply chain stakeholder interviews were recorded, and detailed interview notes produced. For analysis, interview notes were entered into an analysis framework, organised by topic. They were then coded in more detail to bring out emergent themes. An initial coding structure was developed, and inductive coding was used within topics to respond to the specific points raised in interviews. This was then used to produce summary thematic analysis against the key evaluation questions, including verbatim quotes to provide more illustrative detail to themes.

Supply chain stakeholder interviews limitations

Some limitations of supply chain stakeholder interviews, and the efforts taken to mitigate these, are listed below:

- Supply chain stakeholders interviewed self-selected to take part in an interview, thus representing those more likely to take part in research. This limitation was partially reduced by offering a £50 incentive (payment or charity) for participation in the interviews.
- Much of the sample was gathered from the MI data supplied by SHLs, and from snowballing. Projects that had more resource may have been more likely to submit full and up to date MI data and therefore may be overrepresented in the sample. Similarly, SHLs that had a good relationship with their lead contractor may have been more likely to share their contact details. Other sampling approaches used (Trustmark data and EPC certificates) were less successful in generating contacts for interviews, and were therefore less helpful to mitigate this issue.
- The ability to generalise the findings from interviews with 39 installation stakeholders across 17 projects is limited, given the small sample available and low participation in interviews. On the other hand, though not representative of the Wave 1 installation stakeholder audience as a whole, non-case study interviews provided greater variety of projects to analyse. The greater coverage of senior contractors and retrofit coordinators also had more knowledge of challenges across all projects as a whole.

4.4 Qualitative data collection with other stakeholders

Overview of qualitative data collection with scheme delivery stakeholders

Four semi-structured interviews were undertaken with four senior DESNZ staff members with roles covering senior oversight, delivery and analysis. Selection of individuals was discussed

with the DESNZ evaluation team. A single topic guide was developed for interviews with DESNZ staff, with some bespoke questions developed for the representative from the analysis team. However, interviews were conducted flexibly such that individuals only answered questions relevant to their role and experience on Wave 1. These interview guides covered the Wave 1 scheme from beginning to end. Topics included lessons informing scheme design, pre-competition engagement, the application and appraisal process, project delivery, scheme management, and early/anticipated outcomes and impacts. These interviews were undertaken in October 2023.

Four focus group discussions were held with representatives of: the DESNZ IDT team; the TAF; and the DP (at two separate points in time). Tailored topic guides were developed for each group. The TAF focus group and first DP focus group were held in July 2023 and lasted approximately 45 minutes each. These focused upon Wave 1 applications and appraisal processes. The DESNZ IDT focus group and the second DP focus group were held in October 2023 and November 2023 and lasted approximately 90 minutes each. Both of these focus groups covered project delivery, scheme management, and early/anticipated outcomes and impacts, and the IDT focus group also covered competition processes.

Interviews and focus groups were all recorded. Recordings and transcripts were used to write up detailed notes. For analysis, interview and focus group notes were first organised by topic. They were then coded in more detail using NVivo. An initial coding structure was developed, but inductive coding was used within topics to respond to the specific points raised in interviews and discussion groups.

Detailed topics covered in scheme delivery stakeholder data collection

Table 18 in Chapter 7 details the topics covered in DESNZ senior management interviews and in the TAF, DP, DA and DESNZ delivery team focus groups, and the evaluation questions the guides addressed. In summary, the following broad topics were covered:

- Analysis of economic case for Wave 1
- Learnings built into Wave 1
- Pre-competition/competition process and support
- Delivery
- Scheme management
- Early outcomes and impacts (including for SHLs)
- Supply chain outcomes
- Additionality

4.5 Qualitative data collection with SHLs

Case study SHL interviews

Six semi-structured interviews were undertaken individually with representatives of the lead organisation for each case study project. In some cases, consortium partner members joined the interview. The interview guide covered pre-existing retrofit plans and activity of projects, the

Wave 1 application process, project delivery (enablers, barriers, support sources), project monitoring, early/anticipated outcomes and impacts. The interview with representatives of the lead organisation was intended to last about 90 minutes, but actual interviews varied from 50 minutes to 120 minutes in length. This reflected the different nature of the projects, the level of complexity and variation in the project organisations and the types of installations involved.

Project leads were asked to provide contact details for other project representatives who could address any gaps in the original interview and provide specific insight into resident engagement and supply chain procurement and installation management. From this, eight separate follow up interviews were also completed across the case study projects (consisting of one additional interview for four projects, and two additional interviews for the other two projects). These interviews were held with representatives from partner organisations, with one exception where a follow up interview was held with a separate representative of the project lead organisation. Interview length varied from 30 minutes to 110 minutes.

These interviews were undertaken in two tranches each covering three of the case study projects, one from 31st May 2023 to 10th July 2023, and one from 18th September 2023 to 23rd November 2023. The timing coincided with when projects were close to completion in order that SHLs could reflect on their overall project experience.

Additional SHL interviews

In addition to the interviews with case study SHLs, a further 15 interviews were undertaken with other Wave 1 project lead organisations. To ensure a range of SHL projects were included, the SHL sample was selected to ensure minimum, representational coverage of the following characteristics:

- The different geographical regions in which projects were based.
- Inclusion of mixed tenure in project applications.
- Inclusion of clean heat measures in project applications.
- Participation in a consortium-based project.
- Inclusion of properties with EPC F or G.
- Previous participation in SHDF(D).

These interviews were undertaken from 12th October 2023 to 7th November 2023. As this was towards the end of Wave 1 scheme delivery, some projects had already completed while others were nearing completion. Interviews lasted approximately 45 minutes in length and had a more limited topic coverage than the case study interviews. The interview guide covered pre-existing retrofit plans and activity, project delivery enablers and challenges, DP support, and outcomes and impacts of Wave 1.

SHL focus group

Three thematic case studies are also being developed for Wave 1. These explore specific themes in depth. The three topics to be covered are: PAS 2035; hard-to-treat properties; and

retrofit activity undertaken by SHLs not participating in Wave 1.¹⁰ One focus group was undertaken with SHLs in order to collect data specifically relating to the topics covered by two of the Wave 1 thematic case studies: PAS 2035 and hard-to-treat properties. The topic guide for the focus group covered: decision making on installing measures in hard-to-treat properties; enablers, barriers and lessons learned in installing measures in hard-to-treat properties; enablers, barriers and lessons learned in implementing PAS 2035; and the impact of PAS 2035 requirements on Wave 1 projects. Representatives of eight Wave 1 projects were invited to participate in the focus group. These eight projects were selected on the basis that:

- They were not already participating in a case study.
- Their application profile suggested their project included hard-to-treat properties, i.e. with one or more of the following characteristics: lower EPC ratings (F/G), not heated via gas and therefore potentially off-the-gas grid, or high-rise flats or bungalows.
- Some installed or planned to install clean heat measures (as a topic of particular interest).

Five SHL representatives of three Wave 1 projects agreed to participate in the focus group, which was held on 10th October 2023 and lasted for approximately 1 hour.

Unsuccessful and non-applicant SHL interviews

Two interviews were also undertaken with unsuccessful SHL applicants to Wave 1. DESNZ provided a sample of four unsuccessful applicants who had given consent for their contact details to be shared with the evaluation team. All four contacts were approached for interview. Two contacts were unresponsive. The interviews undertaken were held between 30th May 2023 and 23rd June 2023. The interview guide focused upon retrofit activity undertaken outside of Wave 1 and views and experiences of applying to Wave 1.

Three interviews were also undertaken with non-applicant SHLs. These were SHLs who had engaged with the TAF but chose not to apply to Wave 1. DESNZ provided a sample of three non-applicants who had given consent for their contact details to be shared with the evaluation team. Interviews were secured with all three contacts. These interviews were held between 31st May 2023 and 12th June 2023. The interview guide focused upon retrofit activity undertaken outside of Wave 1, views and experiences of TAF support, and reasons why they chose not to apply to Wave 1.

Interviews and focus groups were all recorded. Recordings and transcripts were used to write up detailed notes. For analysis, interview and focus group notes were first organised by topic. They were then coded in more detail using NVivo. An initial coding structure was developed but inductive coding was used within topics to respond to the specific points raised in interviews and discussion groups.

¹⁰ The third thematic case study on “Retrofit activity of SHLs not participating in Wave 1” will be written and published later in the evaluation. It will not be published alongside the Wave 1 Process Report.

Detail of topics covered in SHL interviews

The following themes were covered in the SHL interviews. Table 19 in Chapter 7 outlines individual interview questions and the evaluation questions the guide addressed. In summary, the following broad topics were covered:

- Pre-existing retrofit plans before Wave 1 application
- Engagement with SHRA
- Application process and decision making
- Retrofit activity since engagement with SHRA/the Wave 1 application
- Project delivery including: engaging with the supply chain; resident engagement; interaction with stakeholders and post-installation support
- Anticipated outcomes and impact of Wave 1

Topic guide content of the SHL focus group was developed to feed into the thematic (hard-to-treat properties and PAS 2035) case studies rather than specific evaluation questions. Questions asked are summarised in Table 20 in Chapter 7.

5 Secondary data and MI analysis

5.1 Secondary data and MI data

MI data sources

Extracts from MI data compiled by DESNZ and the DP were shared with IFF Research on a monthly basis. These were provided approximately three weeks in arrears, due to the need for collation and processing time and checks to be performed on data returns.

MI data used for this report was primarily sourced from the following locations:

- **Bid data (SHRA project bid analysis)** compiled during the bid process at the start of SHDF Wave 1, and available for both successful and unsuccessful bids, at a project level, including proposed delivery and costs.
- **Baseline application data** compiled following the selection of successful SHDF Wave 1 bid applicants, and initial modifications to bids to enable signing of contracts. Available only for successful bids, at a project level, including detailed proposed delivery and costs.
- **Change Control data** (data up until end of March 2024) compiled during delivery by DESNZ when considering and approving changes in scope for individual projects. Provides project-level data, including proposed delivery and costs.
- **DP monthly project updates** including risk data and narrative reports, both compiled by SPOCs (Single Points of Contact), who acted as liaisons with the projects. Provides project-level data.
- **Delivery data** comprising properties retrofitted and measures installed. This was gathered by individual projects and submitted to DESNZ via the Data Management

System (DMS). The data used in this report was updated to the end of February 2024. Provides data at an individual property level. The report also cites use of SHDF Official Statistics published in May 2024 (presenting latest statistics to the end of March 2024).

- **Closure reports** submitted by projects after the end of their projects, where available by April 2024.

MI data processing

Bid data, baseline application data, Change Control data and DP monthly project updates were processed in Microsoft Excel as follows:

- Information on successful and unsuccessful bids were checked against delivery MI data and updated, for example where a project had gone ahead from the reserve list.
- Names of organisations from the SHRA project bid analysis (triangulated against baseline application data, to include any rebranding and/or changes to consortia) were matched against the Housing Regulator records to add organisation types and locations.
- The locations of lead organisations for each project were checked against ONS region geography to append region variables, allowing region-by-region analysis of projects.
- A flag was added to identify projects submitting valid delivery MI data, to enable analysis of only these projects.

Delivery data was processed in Microsoft Excel as follows:

- Corrupt and test data was removed, as identified by (A) anomalous contents of fields (e.g. text where numbers were expected) or (B) lack of a valid project ID.
- Duplicate properties were removed using the unique property ID, prioritising the most recent available data regarding a property.
- Data for each project was checked against the latest Change Control data, and where the number of properties retrofitted exceeded the Change Control total, this was investigated and solutions applied on a project-by-project basis (e.g. excluding specific data returns which contained duplicate properties but with different property IDs).
- Individual fields were cleaned manually to maximise the base available for analysis, for example correcting EPC ratings to consist of a single letter rather than also including a numeric SAP rating.
- Outliers were removed from costs data; all individual measure costs reported as less than £10 or over £100,000 per property were removed.

Monthly project updates and closure reports were further processed using NVivo as described below. All other data sources were analysed within Microsoft Excel using pivot tables.

Quantitative analysis of MI data

Statistics were analysed descriptively, using Microsoft Excel pivot tables relevant to the research questions. In general, statistical testing was not used for MI data because it was not

required; statistical error margins are only applicable where partial data (such as a survey) is being used to draw inferences regarding a wider population.

The report includes a narrative on the data to assist the reader in drawing conclusions. Any limitations of the data are also highlighted to ensure correct interpretation of findings.

Qualitative analysis of MI data

Qualitative analysis of MI data was conducted in the following ways:

- Where text responses were short (e.g. explanations of risks) but high in volume, they were referred to our dedicated coding team¹¹ to produce coded responses for numeric analysis.
- Where text responses were longer and more varied in their content, NVivo was used to draw out themes, primarily for analysis of monitoring officer narrative data (data source 1.4). Data was analysed under two broad headings; (a) risks and mitigations put in place, and (b) barriers and enablers to delivery.
- For case studies, individual bids and project risk registers were analysed in detail, to better understand the development of risks through the project timeline.

Qualitative data is presented in the form of narrative reporting, discussing issues emerging from the analysis thematically, supported by anonymised quotes from the sources as appropriate.

5.2 MI data coverage

The bid data and baseline application data were comprehensive, with omissions relating to only a small number of projects, and provided a detailed overview of projects' plans. The key caveat regarding this data is that many SHLs interviewed stated that their knowledge of existing stock was weak. They stated this had been a barrier to application and had also sometimes caused significant changes to their plans for installing measures once initial inspections of individual properties had taken place. This suggests that bid data should be treated with some caution, although it remains likely that the overall stock profile is broadly correct.

Limitations of MI data

There are some limitations to the secondary data sources presented above that affected the extent of analysis possible:

¹¹ The coding team receive the data in a spreadsheet, and load it into their dedicated coding software, Ascribe. They then use this to produce an interim codeframe based on a sample of the data, which is sent to the research team for QA and approval at Research Manager level. The coding is then completed, and given a second QA by the research team, checking the coding of at least 10% of the file. This QA is used to suggest final changes to the codeframe and to the coding of individual responses, before sign-off at Research Manager level. Quantitative data is produced from the final codeframe by IFF's programming team in simple tables (using Merlin software) for analysis by the research team alongside other secondary data sources.

- Bid data, baseline application data and Change Control data, while all comprehensive in coverage, are aggregated to a project level (i.e., they consist of total numbers of properties and overall costs of activities for a project) and therefore cannot be broken down at a property level.¹²
- Delivery data was compiled at a property level, and a comparison against Change Control data suggests that in most cases projects had submitted records for all properties by the end of February 2024. However, this data could still contain errors in the identification of properties or their classification, which are not detectable since we do not have another data source to compare against. Six projects were excluded from analysis (and were also excluded from data used for comparisons with delivery data¹³), either because they did not submit significant quantities of delivery data (one project), they submitted substantially less delivery data than Change Control data suggested (one project), or did not submit any completion dates for more than 40% of properties / measures logged (four projects)¹⁴ despite project milestone data reporting the project as completed.
- In delivery data, projects did not always accurately report all measures installed (e.g. reporting all measures as a single item, only reporting one measure per property, or using vague terminology which made it not possible to classify a measure), and in some cases reported the installation of items which were not measures (e.g. 'scaffolding'), comprised only part of a measure, or were not SHDF funded. It was not possible to remove these from the data. Overall, 260 of 34,294 were coded as 'other' measures. A comparison of Change Control and delivery data suggests that projects often did not record ventilation measures, perhaps because they were considered minor with respect to other measures; Change Control data from March 2024 indicated that 7,315 ventilation measures had been installed or were planned to be installed, but delivery data showed 2,647 were installed as of the end of February 2024.
- Measure costs data was submitted as part of the delivery data by 53 projects (82% of all Wave 1 projects), for a total of 13,351 properties (89% of those properties with completed measures), and for a total of 28,606 measures (87% of measures reported as completed). Base sizes given for costs analyses were therefore smaller. It appears that projects often divided the cost of installation of a measure equally across all properties in which that measure was installed, either on a project-wide or a street-wide basis; this means that variation in installation costs at property level is likely to be understated (and therefore this is not included in reporting), although overall costs are likely to be correct.¹⁵

¹² For example, bid data shows counts of the numbers of measures of each type intended to be installed, and counts of types of properties intended to be included in the project, but because it is not property level data (only headline counts of each separately), we cannot connect types of property to types of measures planned to be installed using this source.

¹³ Note they have not been excluded from analysis which does not use project delivery data – for example, they remain in comparisons of bid data and Change Control data.

¹⁴ It was not possible to impute that installations were completed in cases where the completion date was missing, because often projects had submitted details of other properties which were originally planned to be treated, but had been later removed from scope and therefore would not have been completed.

¹⁵ While reporting of equal costs could be due to projects choosing to simplify their data for ease of reporting, it could also be due to installation being procured from sub-contractors at a fixed cost per property at a street or estate level. In some cases, costs would also be expected to be approximately equal for all properties, for example when attributing costs for a shared facility such as a shared ground loop, or for EWI on a large block of flats. It is not possible to distinguish from the data between projects that have simplified costs information for ease of reporting, and projects which have correctly reported equal costs across properties.

- Narrative reporting and risks listed in monitoring spreadsheets were compiled by the DP, and therefore solely represent their point of view in terms of risks, barriers and enablers to delivery.

6. Calculating the fuel poverty status of households

6.1 Purpose of the analysis

For the Wave 1 process evaluation, the purpose of the fuel poverty analysis was to estimate the proportion of households participating in Wave 1 who were in fuel poverty prior to the scheme installations. Along with other demographic information about the participating households collected via the resident survey, the fuel poverty status provides information regarding what kind of households were reached by the scheme. The derived fuel poverty status of the households could then be used to compare the views and experiences of participating households likely to be in fuel poverty with those not likely to be in fuel poverty.

Fuel poor households were not a direct target for the scheme, and fuel poverty status was not part of the eligibility criteria for participation in the scheme. However, energy efficiency improvement schemes such as SHDF indirectly help the Government to reach the statutory fuel poverty target, set in December 2014. The target is to ensure “that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030”. Improving the energy efficiency of dwellings was a key objective of the Wave 1 scheme and a reduction in energy demand will also reduce fuel poverty as a result.

6.2 Defining Fuel Poverty

The current Government definition of Fuel Poverty being used in England¹⁶ is the Low Income, Low Energy Efficiency (LILEE) metric. Under this definition, households are fuel poor if: they have a Fuel Poverty Energy Efficiency Rating (FPEER)¹⁷ of band D or below, and the equivalised household income (income after tax, National Insurance, and housing costs) minus their required fuel costs falls below a set income threshold (defined as 60% of the national after-housing-cost (AHC¹⁸)).

¹⁶ <https://www.gov.uk/government/collections/fuel-poverty-statistics>

¹⁷ The fuel poverty energy efficiency rating (FPEER) methodology is based on the Government's Standard Assessment Procedure (SAP) for assessing the energy performance of domestic properties while taking into account the impact of policy interventions (e.g. Warm Homes Discount) that directly affect household energy costs. Like SAP, the methodology gives an energy efficiency rating from 0 (lowest) to 100 (highest), which can be translated into an energy efficiency 'Band' from G (lowest) to A (highest). The Warm Homes Discount (WHD) is applied directly to an eligible household's electricity bill.

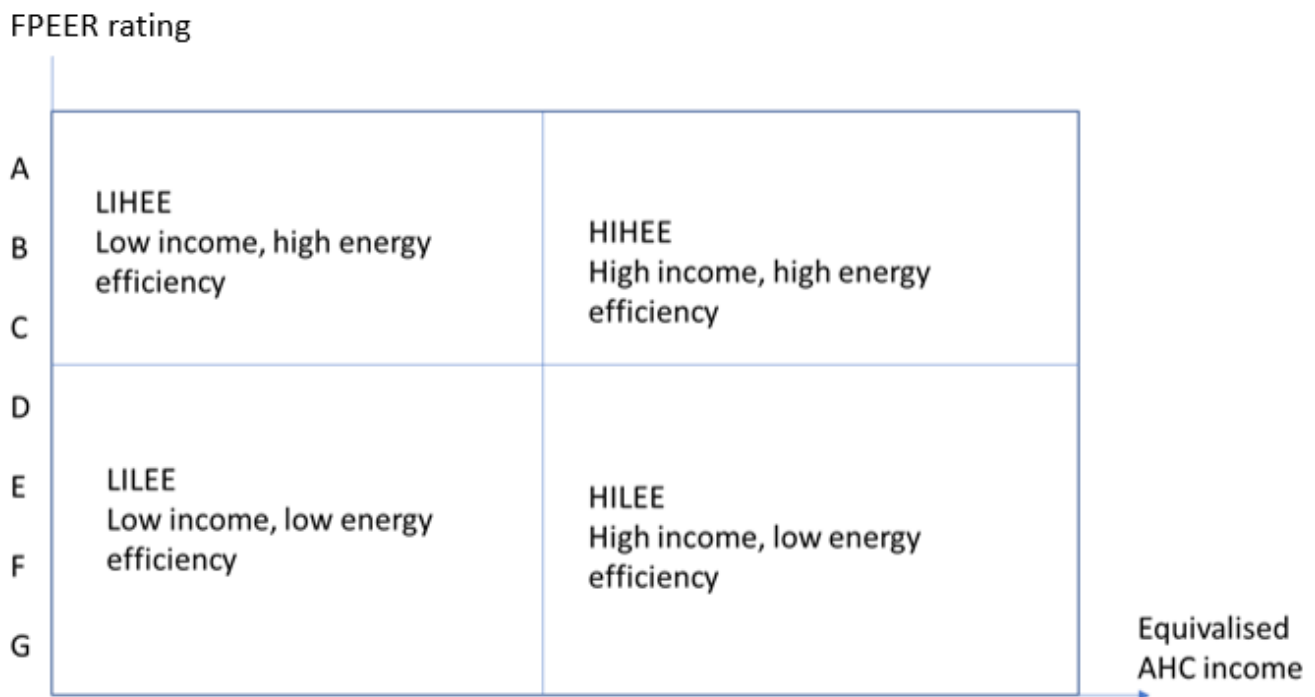
¹⁸ Chapters 3 and 6 of [Fuel poverty methodology handbook \(Low Income Low Energy Efficiency\) 2024 \(publishing.service.gov.uk\)](#) provide more detail on the national methodology.

When assessing for their fuel poverty status (using the LILEE definition), all households were divided into one of four quadrants, namely:

- The LILEE quadrant - households with low income and low energy efficiency. Households where the income is below the set income threshold and where the FPEER of their home is band D or below. These indicate households in fuel poverty.
- The LIHEE quadrant - households with low income but living in a home with high energy efficiency. Households where the income is below the threshold but where the FPEER is band C or above. Although these households have low income, they are not deemed to be in fuel poverty because of their home’s high energy efficiency.
- The HILEE quadrant - households with higher income and living in a home with low energy efficiency. Households where the income is above the threshold but where the FPEER is band D or below. Although these homes have low energy efficiency, households are not deemed to be in fuel poverty because of their higher income.
- The HIHEE quadrant - households with higher income and living in a home with high energy efficiency. Households where the income is above the threshold and where the FPEER is band C or above. These households are in the most favourable category and are not considered to be in fuel poverty as their homes have high energy efficiency and they have high income.

The quadrants associated with the LILEE method are shown in Figure 7, together with their associated FPEER rating and equivalised AHC income levels.

Figure 7: LILEE method associated quadrants



The (FPEER) methodology is based on the Government’s Standard Assessment Procedure (SAP) for assessing the energy performance of domestic properties. The SAP method is also used to generate Energy Performance Certificate (EPCs). The difference between the FPEER method and the method used to generate an EPC is that the FPEER method also takes into

account the impact of policy interventions that directly affect household energy costs (e.g. Warm Homes Discount (WHD)). Receipt of the Warm Homes Discount was not collected in the SHDF resident survey and therefore it was not possible to calculate an FPEER rating. However, EPC data was available for the majority of cases. The impact of the WHD rebate on FPEER depends on the relative size of the rebate to the total energy bill,¹⁹ however for the purposes of estimating the fuel poverty status of the SHDF households an EPC rating was the best proxy for the FPEER band available. Receipt of WHD or similar policy interventions only impacts the fuel poverty status if the dwelling EPC rating is within a few points of the SAP 69 threshold. For these reasons EPC bands was used as a proxy for FPEER bands when estimating the likely fuel poverty status of the households.

6.3 Derivation of after housing cost income

The resident survey collected income information which has been used to estimate if a household falls into the 'low income' category of the LILEE fuel poverty definition. Limitations of this method are set out in [Section 6.6](#). Respondents were asked to estimate the amount of money they have left after accounting for housing costs. They were asked whether their household income after housing costs is above or below a threshold which is based on the number of children (aged 13 or younger) and adults (aged 14 and over) in the household and an equivalised fuel cost. The threshold is calculated as follows:

SHDF income threshold = 60% median AHC equivalised income + median equivalised fuel costs

Income threshold = £15,834²⁰ x (0.58²¹ + (0.42 x (number of adults in household – 1)) + (0.2 x number of children in household)) + £1,620²² x (fuel cost equivalisation factor)

The calculation was embedded in the survey script to feed in the appropriate income threshold into the relevant question:

K9: Once your household has paid any [IF B9 = 1 OR 2:mortgage][IF B9 = 3, 4 OR 5:rent][IF B9 >= 6:housing costs] and service charges, would you say the money you have left each month is more than <K2_DUM> or less than this?

The participants' response to this question was used to identify if the household was a high- or low-income household under the LILEE definition.

Analysis of the Wave 1 survey data showed that 34% of householders surveyed did not provide a response to this question (989 householders out of the 1,498 total did provide a

¹⁹ For more information on the impact of the Warm Home Discount see Annex F of the 2024 Annual fuel poverty statistics report, [Annual fuel poverty statistics in England, 2024 \(2023 data\) \(publishing.service.gov.uk\)](#)

²⁰ At the time of question development, this was the most recently published income threshold, representing 60% of the median equivalised AHC income for 2021 (EHS 2020 + EHS 2021 datasets).

²¹ AHC income equivalisation factors used in the calculation of LILEE. See Table 11 in [Fuel poverty methodology handbook \(Low Income Low Energy Efficiency\) 2024 \(publishing.service.gov.uk\)](#) for further information.

²² At the time of question development, this was the most recently published median equivalised fuel costs for all households in 2022 (based on projections using the EHS 2020 + EHS 2021 datasets).

response). To maximise the available sample size for income data, for those householders who did not respond to question K9, their responses to other income questions were considered. The response to question K8 “Is your household’s total income more or less than £16,000 each year before taxes and any other deductions?”, was used where we assumed “less than £16,000 a year” to be the proxy for the fuel poverty low-income threshold.

Where respondents did not answer questions K9 or K8, responses provided at K6 “How much, together, is your household's income before tax?” were used. We assigned the responses in income bands 1 and 2 (<£15,999 per year) as low income (as the banding of the income questions had been designed to represent as closely as possible the fuel poverty income threshold of £15,834).

Data from question K7 (“Is anyone in your household, including yourself, currently receiving any of these benefits?”) was used if the householders did not answer questions K9, K8 or K6. Respondents answering yes to receiving any of Universal Credit, Housing Benefit, Pension Credit, Council Tax Benefit were categorised as low income.²³

This process enabled the inference of a household’s low-income status for 86% of the Wave 1 sample (n=1,290, 86% of all survey respondents). For the remaining 14% of cases (n=208 of all survey respondents) it was not possible to compute a fuel poverty indicator and these cases were excluded from any fuel poverty analysis.

6.4 Derivation of the dwelling energy efficiency

The pre- and post-installation EPC rating for each dwelling was supplied by the scheme managers from individual Wave 1 projects, as part of their monthly monitoring data reports submitted through the DMS. The pre and post EPC ratings were based on surveys of the dwellings, before and after the installations, in line with the requirements of PAS 2035. This data was collated and cleaned by the DESNZ official statistics team before being supplied to IFF and BRE. The cleaning process for the pre-installation EPC data consisted of three steps:

Step 1: If both the EPC band (character: A - G) and SAP rating (numeric values: 1-100) had been supplied in the ‘Pre-Install’ column of the DMS reports, the EPC band was recorded as the official ‘Pre-Install’ EPC.

Step 2: If only the SAP rating had been supplied, the pre-installation EPC band was assigned following Table 14 in the SAP 2012 document²⁴:

SAP points ≥ 1 and SAP points < 21 , code it as ‘G’

SAP points ≥ 21 and SAP points < 39 , code it as ‘F’

²³ These benefits are means-tested and as such householders will only be eligible to receive them if they are on a low income. The exact income threshold does vary for the different benefits, but in the main, receipt of any of these benefits should be a sufficient proxy for a household being below the fuel poverty low income threshold.

²⁴ The Government’s Standard Assessment Procedure for Energy Rating of Dwellings 2012 edition. Accessed from Standard Assessment Procedure (SAP 2012) - BRE Group

SAP points ≥ 39 and SAP points <55 , code it as 'E'

SAP points ≥ 55 and SAP points <69 , code it as 'D'

SAP points ≥ 69 and SAP points <81 , code it as 'C'

SAP points ≥ 81 and SAP points <92 , code it as 'B'

SAP points ≥ 92 and SAP points ≤ 100 , code it as 'A'

Step 3: The pre-installation EPC was recorded as 'Null' (i.e. 'Unknown' in publication) for all other entries.

The cleaned and finalised EPC data was then matched to the resident survey data by IFF using UPRNs submitted through the DMS. Of the 1,498 Wave 1 survey respondents, 1,233 (82%) had a pre-installation EPC which could be matched on. For the remaining 265 properties (18%), no pre-installation EPC was found. In 61 cases this was because the property was matched but the EPC rating was absent. In 204 cases, no match was made. The two most likely causes are properties changing their UPRN between survey sampling and data analysis, and properties being descoped from Wave 1 between survey and collection of EPCs. However, in the absence of a match, no definitive cause can be determined for individual cases.

Where both the income and EPC data was available, BRE were able to derive the fuel poverty status of the household. The achieved sample on which the fuel poverty status could be derived was $n=1,053$ (70% of all Wave 1 respondents).

6.5 Derivation of fuel poverty status

The households were classed as either 'high' or 'low' income, under the LILEE Fuel Poverty definition, based on their responses to the resident survey questions (as described in Section 5.2). The homes were classified as being either 'low energy efficiency' (below band C) or 'high energy efficiency' (band C or above) based on the pre installation EPC data supplied. Combining the income and energy efficiency data enabled BRE to identify the LILEE quadrant applicable for each household and estimate the household's fuel poverty status. If a household had an equivalised AHC income of below the income threshold, and a modelled EPC band of D or below, then the household was classified as likely to be in fuel poverty.

As noted above, this is only a proxy fuel poverty status, which has been developed to represent the LILEE fuel poverty definition, currently in use in England. Differences in the data collection process, the model used to calculate an EPC band, and the method of combining income and energy efficiency metrics due to the limited data available, means that the actual fuel poverty status of each household (were it to be calculated using a full LILEE dataset) may differ slightly.

Table 12 summarises the achieved sample sizes for the individual components of the fuel poverty indicator and for the final derived indicator.

Table 12: Achieved sample sizes for the derivation of the fuel poverty indicator

Total household survey cases	1,498
AHC income provided	1,290 (86%)
EPC data provided	1,233 (82%)
Both EPC and AHC data provided	1,053 (70%)

Table 13 shows the demographic profile of the 1,053 residents who had both EPC and AHC data provided and could therefore have their fuel poverty status calculated.

Table 13: Unweighted demographic profile of residents whose fuel poverty status was calculated

Demographic	n	%
Gender		
Male	302	29%
Female	703	67%
Prefer not to say / missing	48	5%
Age		
18-34	106	10%
35-54	321	30%
55-74	455	43%
75+	139	13%
Prefer not to say / Missing	31	3%

Demographic	n	%
Ethnicity		
Asian/Asian British	27	3%
Black/African/Caribbean/Black British	33	3%
Mixed/Multiple ethnic groups	25	2%
White	953	91%
Other ethnic group	4	0%
Prefer not to say / Missing	11	1%
Disability		
Yes, limits activities all of the time	400	38%
Yes, limits activities some of the time	245	23%
Yes, but does not limit activities	72	7%
No	299	28%
Prefer not to say / Don't know / Missing	37	4%

6.6 Limitations

For a standard fuel poverty assessment (upon which the national fuel poverty statistics are based) a huge amount of detailed information is collected regarding the household, their

income (via the EHS householder survey²⁵ for example), their energy costs (fuel prices) and the energy efficiency of the dwelling they live in (via a detailed building survey). For the Wave 1 evaluation it was not possible to collect this level of detailed information for each participating household and therefore BRE developed a proxy fuel poverty status, based on the same LILEE method used for the national fuel poverty statistics, but using the limited available data.

For the national housing surveys, the AHC income of a household is calculated based on a large number of demographic and income questions. Due to restrictions on the length of the Wave 1 resident survey, and the number of other topics that needed to be covered in the survey (to meet the needs of the evaluation), it was necessary to collect the relevant data with far fewer income questions (compared to the national housing surveys). This necessary approach for the Wave 1 evaluation is likely to reduce the accuracy of the reported AHC income (in comparison to a full set of EHS questions), however, by how much, it is not possible to say. In particular, it should be noted that the use of questions K6²⁶ and K8²⁷ to impute the low-income flag for the 172 households that did not provide an answer to question K9²⁸ is likely to result in an underestimation of these households being identified as fuel poor. This is because their tax, housing costs, fuel costs and equivalisation due to household composition, were not included in the income threshold used in that question. As a result, the estimated percentage of Wave 1 households who were fuel poor prior to the installation could be slightly underestimated.

Estimated bias

Fuel poverty could not be calculated for every property; as detailed above, 445 cases either lacked the income data or the EPC data required for the calculation. Examining unweighted survey data, the group with fuel poverty status calculated differ from those without a fuel poverty status calculated as follows²⁹:

- More likely to have a disability which limits their activities all of the time (38% vs 32%), or a disability which does not limit their activities at all (8% vs 5%). Both these groups are more likely than average to be fuel poor, among those providing sufficient data.
- More likely to be female (71% vs 63%); again, female respondents are more likely than average to be fuel poor, among those providing sufficient data.
- Less likely to be in full time work (20% vs 25%); this group are less likely than average to be in fuel poverty, among those providing sufficient data.

²⁵ English Housing survey: <https://www.gov.uk/government/collections/english-housing-survey>

²⁶ [household / personal] income before tax.

²⁷ Whether household's total income is more or less than £16,000 each year before taxes and any other deductions.

²⁸ "Once your household has paid any [mortgage/rent/housing costs] and service charges, would you say the money your household has left each month to pay for other expenses (for example food, clothing or utility bills) is more than <threshold> or less than this?"

²⁹ Tested to 95% significance, z-test. No differences of more than one percentage point were found by property type, size of household or age group. There were differences associated with not answering demographic questions (i.e., those unwilling to provide income were also likely to be unwilling to give all other types of information). These are not shown for clarity. Also, for clarity, inverses of links found are not shown (e.g. if female respondents are more likely to have a fuel poverty indicator, we do not also state that male respondents are less likely, since this is inevitable).

- Less likely to be of ‘other’ ethnicity (0% vs 2%); no data is available on the fuel poverty of this group due to small sample size.

This suggests overall that the effect of non-response and absence of EPC data is that the estimated proportion in fuel poverty (given as 82%, weighted, across the survey) is likely to be a slight underestimate.

7 Appendix: Primary data collection

7.1 Resident survey

Table 14: Core questions asked in the Wave 1 resident survey, and relevant themes, evaluation questions and contribution claims addressed

Section	Survey question	Evaluation Question
Awareness of energy saving measures	Are you aware of the energy savings measures that have been installed/are due to be installed in your home?	7.6
	Are you aware that the energy savings measures that have been installed/are due to be installed in your home are funded by the SHDF?	7.6
Property profile	When did you move into your home and what type of home do you live in (including number of floors, number of bedrooms, year the home was built...)?	Context to support analysis
	Do you own or rent the home, and who is your SHL?	Context to support analysis
Installation status	Which energy saving measures, and specifically which type, were installed or are due to be installed in your home?	Context to support analysis
	Which energy saving measures were already installed in your home before installations under SHDF?	Context to support analysis

Section	Survey question	Evaluation Question
Heating status	Before receiving the energy saving measures, which of these was the main way you heated your home? Which of these other type(s) of heaters did you use in your home?	7.6
	Which of these is the main way that you currently heat your home? And which of these other type(s) of heater do you use in your home?	7.6
	Thinking about these other types of heaters, overall, do you use them more or less often since the energy saving measures were installed? Which of the following reasons is why your energy use has increased/decreased/stayed the same?	7.6, Contribution claims 8a, 8c and 8d
Issues experienced in home	Before you received the energy saving measures, did you have any of these problems with your home? Do you currently have any of these problems with your home? (e.g. mould/mildew, condensation/steamed up windows and draughts).	5.2, 5.4
	For each problem you identified, has this got better, worse, or has there been no change since the energy saving works?	5.2, 5.4
	For each problem, did you take any other actions to solve this (apart from receiving the energy saving measures)?	5.2, 5.4
	Since the energy saving measures have been installed, have you experienced any new problems in your home?	Context to support analysis
Motivations	What were your reasons for having the energy measures installed?	2.1, 2.3

Section	Survey question	Evaluation Question
	How much do you agree or disagree with the following: "I was able to arrange the installation at a date and time convenient to me." Why do you say that?	2.1
Installation process	Thinking about the installation process, to what extent were you satisfied or dissatisfied with: communication from the LA / your SHL, noise levels, general disruption to you / the household?	2.1, 2.3
	Thinking about the information you have received so far about the energy saving measures, how satisfied or dissatisfied were you with communication from the LA / your SHL / installer?	2.1, 2.3
	Thinking about the time it took to complete the installation of energy saving measures, how did this compare with your expectations? Overall, how satisfied, or dissatisfied are you with the installation process?	2.1
Confidence using energy saving measures	Have you received any support or guidance about how to use the energy saving measures?	2.1
	How confident do you feel operating the equipment, cleaning the equipment and so on? What would make you feel more confident?	2.1
Outcomes of measures	Overall, how satisfied are you with the energy performance measures installed?	5.1
	Have you seen any changes to your household energy bills since the work has been completed? Why do you say that?	5.3, 7.3,
	To what extent do you agree or disagree with the following statements? It's easier to maintain a comfortable temperature in my home; it's more affordable to heat my home; my mental health has	5.2, 5.4, 5.5, Contribution claim 12a

Section	Survey question	Evaluation Question
	improved since the work; I have more pride in my home. To what extent are you less worried about being able to afford to heat your home?	
Views on further energy saving installations	As a result of having energy saving measures installed, would you say you are more or less likely to consider other energy saving installations in the future?	5.6, Contribution claim 10a
Demographic questions about household	<p>How many people live in your house? What is the age, gender, employment status of those living in the household, and do you or anyone else in your household have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more that limits your or their day-to-day activities?</p> <p>What is your ethnicity? What is your household's total income? Is anyone in the household receiving any of these benefits...? Does the home have a smart meter?</p>	Context to support analysis

7.2 Resident interviews

Topic guide coverage

Table 15: Core questions asked in the participating resident interviews

Section	Question	Evaluation Question
Information about household	Could you begin by telling me a bit about how you feel about your home? The way it looks, the noise in your home, any issues with the property such as damp or mould, condensation, draughts, inability to heat (or afford to heat) your home to a comfortable temperature?	Context to support analysis

Section	Question	Evaluation Question
	<p>Without the heating on, do you have a comfortable temperature in your home? How does this vary depending on the time of year? In the past year, did you notice any change in how much heating you use? Why?</p> <p>What type of energy saving measures, if any, does your home have in place? Confirm installations and initial thoughts on these</p> <p>Do you think these measures help to keep your home at a comfortable temperature? Why? Do you think these measures help to save energy in your home? Why?</p>	Context to support analysis
	<p>Do you pay for your energy by contract or through a pay-as-you-go or prepayment meter? If contract, what type of contract is it (variable/fixed, term length)? Approximately how much do you spend on your energy bills (per month/year)? Did you notice a change in your energy bills over the last year or so? If so, what was the change? How do you feel about your energy bills? Why do you say that? What support, if any, do you receive for paying your energy bills?</p>	Context to support analysis
	<p>How would you describe the relationship you have with your SHL?</p>	Context to support analysis
	<p>Can you talk me through your experience of any other large works previously carried out by your SHL in your home? How was this experience? What impact did the works have on you?</p>	Context to support analysis
Initial approach and communication about SHDF Wave 1	<p>How did you first find out about the measures your SHL offered to install in your home (e.g. letter, telephone call, face-to-face conversation)? How did you feel about the way</p>	2.1, 2.3

Section	Question	Evaluation Question
	you were told about the installation? Why do you say that?	
	Could you briefly describe any communication you had with your SHL following the initial contact about the installations? What was the reason for this communication? Were you satisfied with the volume and content of communication you received from your SHL? Why? Were you satisfied with the outcome of this communication? Why?	2.1, 2.3
Motivations to receive measures	What energy saving measures were you offered to have installed in your home?	2.2
	How was the decision to have the measure/s installed made in your household? Who was responsible for making the decision? Did you or anyone in your household seek any support/advice when making the decision (with your SHL, neighbours or friends, or advice online or social media)? If yes, was this helpful? Why? How confident did you feel making the decision? Did you feel able to say no to having the measure/s installed?	2.3
	What did you think the benefits would be of having these measure/s installed? Which of these, if any, were more important to you? Why?	2.3
	Did you think there would be any drawbacks? What drawbacks were you worried about, and did they impact your decision to have the measures installed? Why?	2.3, 2.4
	Were you interested in having any other energy savings measures installed, that your SHL did not offer? If yes, please specify? Why were you	2.3

Section	Question	Evaluation Question
	hoping your SHL would offer these measures specifically?	
Installation process	First, could you please talk me through your experience of having energy saving measures installed? When did the process first start? What happened next? Did you experience any disruption, issues or difficulties during the installation process? In what way?	2.1
	Have you experienced any immediate concerns with the measures since they were installed? Why do you say that?	2.1
	Could you describe what sort of communication you had with your SHL or installers during the installation process? Was it via letter, telephone call, face-to-face conversation? How did you feel about the way you were communicated with? Why do you say that?	2.1
	What would you say your experience of the installation process has been like overall (positive / negative)? How have you felt about it? Why do you say that? Do you feel that the installation process met your expectations? Why / why not?	2.1
Outcomes of measures	You mentioned in the survey that your energy use had increased/stayed the same/decreased since the energy saving measures were installed. Is this the case? Can you talk me through why you think this is?	Contribution claim 12b, 8c, 8d
	You also mentioned in the survey that you had seen positive/negative impacts in the following after the energy saving measures were installed: [INSERT FROM SAMPLE]. Could you	5.2, 5.3, 5.4, 5.5 Contribution claim 12a, 12b

Section	Question	Evaluation Question
	<p>describe in more detail the impact the measures have had on the following...</p> <ul style="list-style-type: none"> - Energy bills (probe on any government support received). - Worries about paying energy bills. - Maintaining a comfortable temperature in your home. - Condition of the property e.g. mould/damp. - Physical health. - Mental health/wellbeing. - Pride in home. 	
	<p>Have you experienced any other positive effects of having the energy saving measures installed in your home?</p> <p>What impact, if any, have you seen on building standards and safety where you live as a result of the energy saving measures? This could be changes to things like access into the building, fire and smoke alarms, or escape doors.</p> <p>Would you say that the improvements we have discussed today are a direct result of having the new energy saving measures installed? Why do you say that? Do you think that inflation, cost of living, and generally high energy prices have limited the benefits you have felt from these measures? In what ways? Why / why not?</p> <p>Have you experienced any negative effects as a result of having the energy saving measures installed in your home? How have these effects impacted you or your household?</p>	<p>5.2, 5.3, 5.4, 5.5</p>

Section	Question	Evaluation Question
	Have you told anyone about these negative experiences before today? Has anything been done by your SHL or others about these negative effects?	
Satisfaction with and understanding of measures	You mentioned in the survey that you were generally satisfied/dissatisfied with the energy performance measures installed. Can you tell me why? How have you found using the energy saving measures...easy / challenging? Why? What, if any, guidance or support did you receive from your SHL, the installers, or from elsewhere? How helpful was this support? What other guidance or support would you have liked?	5.1
	How confident do you feel that you understand how the measures installed in your home work/know how to use them? Why do you say that? Could you talk me through any questions you have about how the measures installed work or how you should use them? What impact does this have on you? What, if anything, could help you to better understand how the measures work and how to use them?	5.1
Awareness of decarbonisation and SHDF	How interested are you in climate change, and the things we can do to reduce the impact we have on the environment? How important is this for you compared to other current issues which impact you? Which issues are more important to you, if any, and why?	Context to support analysis
	How interested are you in the energy efficiency of your home? By energy efficiency, we mean	Context to support analysis

Section	Question	Evaluation Question
	the amount of energy such as gas or electricity, that is needed in your home, for example to use the heating or have the lights on. Why are you interested in how much energy is used in your home?	
	Can you tell me what you know about the government's SHDF? ...the goals of the funding?...what is the funding used for?...who do you think provides the funding to do the works? Who do you think carries out the works?	2.3
Attitudes towards energy saving measures	Have the energy saving measures installed in your home changed the way you think about energy efficiency in your home? In what way? What other energy saving measures would you be interested in having installed, if any? Why / why not? Do you have any plans for other energy saving measures to be installed in your home in the future?	5.6 Contribution claim 10a

Interviewee profile

Table 16 below shows the distribution of the 150 interviews by case studies, resident characteristics, property type and measures installed.

Table 16: Resident interviews achieved by key categories

Category	n	%	Category	n	%
By project case study			Type of home (b2)		
Durham	25	17%	Bungalow	45	30%
Coventry	7	5%	Flat, apartment, or bedsit	20	13%
London Borough of Waltham Forest	1	1%	House	83	55%

Category	n	%	Category	n	%
Liverpool	7	5%	Maisonette	2	1%
Norwich	5	3%	Property size – number of bedrooms (b7)		
Crawley	3	2%	1 bedroom	27	18%
All excluding case studies	102	68%	2 bedrooms	67	45%
Gender (k2)			3 bedrooms	51	34%
Male	65	43%	4 bedrooms	3	2%
Female	85	57%	Don't know	2	1%
Age (k2)			Property age (b8)		
18-24	2	1%	Built before 1919	6	4%
25-34	10	7%	1919-1930	7	5%
35-44	15	10%	1931-1944	19	13%
45-54	22	15%	1945-1964	34	23%
55-64	40	27%	1965-1980	20	13%
65-74	39	26%	Post 1980	4	3%
75-84	16	11%	Unknown	60	40%
85+	1	1%	Types of measures installed		
Not available	5	3%	Energy efficient lighting	38	25%
Participant/household disability status (k3)			Solar panels	31	21%
Yes – It limits my/their activities all of the time	58	39%	Insulation	139	93%
Yes – It limits my/their activities some of the time	28	19%	Windows/ Doors	82	55%
Yes – It does not limit my/their activities	10	7%	Controls for a heating system, other than a basic thermostat or heater valves	31	21%

Category	n	%	Category	n	%
None	35	23%	Extractor fan(s)	91	61%
Prefer not to say / Don't know	19	13%	Heat pump	9	6%
Ethnicity (k4)			Draught proofing	27	18%
White	136	91%	Ventilation	50	33%
Asian / Asian British	3	2%	Heating type before installation (d1)		
Black/African/Caribbean/Black British	6	4%	Central heating - electric	7	5%
Mixed/multiple ethnic groups	1	1%	Central heating - mains gas	102	68%
Not answered	4	3%	Central heating - other	7	5%
Satisfaction with installation (g4)			Heat pump	1	1%
Very satisfied	43	29%	Open fire or wood burning stove	4	3%
Satisfied	44	29%	Another method	9	6%
Neither satisfied nor dissatisfied	19	13%	Electric/portable heaters	9	6%
Dissatisfied	21	14%	Prefer not to say/ Don't know	11	7%
Very dissatisfied	13	9%			
Not applicable or Don't know	10	7%			

7.3 Qualitative interviews with supply chain stakeholders

Table 17: Supply chain stakeholder topic guide outline mapped by audience and evaluation area

Theme	Question	Audience	Evaluation area
Background on role and responsibilities within their own business	How many years of experience do you have working in the industry of retrofitting housing with energy efficiency measures?	All audiences	Context to support analysis
	Which area(s) of the UK does your company operate in?		
	What types of installations are you typically responsible for? Types of measures Domestic vs non-domestic New build vs existing retrofit		
Understanding of SHDF and reasons for involvement	Can you talk me through your understanding of the SHDF?	All audiences	Context to support analysis
	How did you initially get involved in the SHDF?		
	Why did you decide to get involved? How did you find communication from Government/SHLs? What concerns, if any, did you have about participating? (Prompt on uncertainty over long term future of SHDF)	Installations managers, principal contractors, retrofit coordinators	Contribution claim 4a, 4b

Theme	Question	Audience	Evaluation area
	Which other government funded initiatives are you involved in, if any?	Installations managers, principal contractors, retrofit coordinators	Context to support analysis
Activities being conducted as part of SHDF	Which of the following providers have you been working on retrofitting projects for?	All audiences	Context to support analysis
	Were you aware that these [specify relevant projects] have been funded by the SHDF?		
	What types of measures have you been involved with installing in the social housing properties?		
	What types of buildings have the measures been installed on?		
	Roughly what proportion of your time do the SHDF retrofitting projects take up of your total time spent working?		
	Were you involved in helping to select the buildings that received the retrofitting works? If so, how did you contribute to this decision?		

Theme	Question	Audience	Evaluation area
	<p>What factors were considered?</p>		
	<p>Can you talk me through who else you worked with to install these measures? E.g. other plumbers/installers, retrofit co-ordinators, social housing staff, manufacturers etc.</p> <p>If multiple measures were being installed on individual properties were these done around the same time or in stages?</p>		
<p>Communications with SHL</p>	<p>How did you find communication with the SHL? How clear were their expectations? What worked well? What was less useful? Were there any misunderstandings? If so what impact did these have?</p>	<p>All audiences</p>	<p>Evaluation question 2.3</p> <p>Contribution claim 4a</p> <p>Installer objective 1</p>
	<p>Was there anything the SHL requested that you were unable able to do? Why?</p>		<p>Evaluation question 9.2</p> <p>Installer objective 1</p>
	<p>You mentioned previously working with others in the process of installing the measures. How did you find this process? What issues, if any, did you encounter? How did you resolve these?</p>		

Theme	Question	Audience	Evaluation area
Challenges and barriers to delivery of installations	To what extent have you been able to complete energy efficiency installations within the allotted timeframes and budgets set out in the scheme requirements?	All audiences	Evaluation question 2.1 Installer objective 1
	Which types of energy efficiency installations do you find the most challenging to complete as part of the SHDF? Why? And how did you overcome these challenges?	All audiences	Evaluation question 8.2 and 2.2 Installer objective 1
	Can you talk me through any unexpected problems or difficulties when carrying out energy efficiency installations as part of the scheme? How common were these? What was causing these issues?	All audiences	Evaluation question 9.3 Installer objective 1
	Have you noticed any changes in the types of energy efficiency installations being requested by clients as a result of the SHDF scheme?	Installations managers, principal contractors, retrofit coordinators	Evaluation question 6.2 Installer objective 4
Quality of work	What feedback have you received from clients (social housing providers) and residents about the quality of work carried out as part of the SHDF? How satisfied were they with the work you undertook?	All audiences	Evaluation question 2.1, 5.1 Installer objective 1

Theme	Question	Audience	Evaluation area
	How have you felt about the quality of the installations? What, if anything, affected the quality of the measure you were able to install?		Evaluation questions in section 5 Installer objective 1
	How did the PAS 2035 quality requirements impact the way you delivered this work, and the quality of the work? Why do you say that? Did the SHDF quality requirements contribute to any challenges undertaking the work? What impact did this have?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 4.2 Contribution claim 6a, 7c Installer objective 3
	Were property improvements made in one period of time or were multiple, separate visits required to install difference measures? If the latter, why was this? What was the impact to the resident and to the contractor?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 4.3 Installer objective 1
Capacity, training and accreditation	Did you have access to the staff you needed to meet the requirements for these projects? If not, what did you do to meet these capacity needs? How did you find this process? What challenges, if any, did you encounter? What caused these and how did you overcome them?	Installation managers, principal contractors, retrofit coordinators	Contribution claim 7a, 5b

Theme	Question	Audience	Evaluation area
	To what extent do you feel you have the sufficient skills in the following retrofitting measures? Why do you say that? What is lacking?	Installers and installation managers	Evaluation question 4.2, 9.1 Contribution claim 6a Contribution claim 7a Installer objective 3
Which of the following retrofitting installation measures have you attended/received training for? What skill progression, if any, have you noticed in your staff as a result of working on SHDF projects?			
Are there any types of retrofitting measures that you would like to be involved in delivering but currently don't do?			
	In what way, if at all, do you think the requirement for PAS 2035 accredited businesses and Trustmark accredited businesses on SHDF projects benefits the energy efficiency retrofitting industry? Do you think existence of government funded projects with these requirements encourages more upskilling within the industry? Why, why not?	Installation managers, principal contractors and retrofit coordinators	
Have you been engaged in learning management as part of these works? Can you describe this, and how you have used these learnings?			

Theme	Question	Audience	Evaluation area
	To what extent was this driven by SHDF participation?		
	How easy or difficult has it been to find sufficiently qualified installers/businesses to help deliver the project?		
	Are there any areas (measures/regionally) where resourcing issues are particularly acute?		
Value for money	How appropriate do you feel the retrofitting measures installed on the project were for the buildings they were installed in? Why do you say that?	Installers and installation managers, retrofit coordinators	Evaluation question 4.1, 8.1 Installer objective 1
	How, necessary do you feel it was for these particular retrofitting measures to be installed in the buildings they were installed in? Why do you say that?	Installers and installation managers, retrofit coordinators	Evaluation question 4.1, 8.1 Installer objective 1
	Have you noticed any variation in installation costs money for different types of installations, in different building types or regions?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 8.1 Installer objective 1

Theme	Question	Audience	Evaluation area
	Could you talk me through any areas where you think costs ended up being higher than expected? Why did this happen? How could this be avoided on future projects?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 8.1 Installer objective 1
	In what way, if at all, were you able to provide value for money on these projects through any innovative techniques, processes or materials used? How did participation in SHDF drive this? (e.g. PAS requirements, active learning management or other routes). What impacts did this have? To what extent did other government initiatives separate to SHDF (including ECO or the Great British Insulation Scheme, the Home Upgrade Grant), contribute to any innovation?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 8.5 Contribution claim 6a, 7b Installer objective 1
	In what way, if at all, has this project contributed to your retrofit work becoming more cost effective due to e.g. volume of work leading to economies of scale? To what extent did other government initiatives separate to SHDF (including ECO or the Great British Insulation Scheme, the Home Upgrade Grant), contribute to this?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 8.1 Contribution claim 5a, 7b

Theme	Question	Audience	Evaluation area
External factors	In what way, if at all, have the impacts of Covid-19 affected project delivery?	All audiences	Evaluation question 2.4 Installer objective 2
	In what way, if at all, have the impacts of the UK's exit from the EU affected project delivery?		
	In what way, if at all, have the impacts of high inflation affected project delivery?		
	Have there been any other external factors that have impacted project delivery?		
Realisation of project benefits	How, if at all, will your experience of the SHDF affect the types of projects and the types of retrofit measures you install in future?	Installation managers, principal contractors, retrofit coordinators	Evaluation question 9.2 Installer objective 3
	<p>What tangible benefits resulting from the SHDF scheme have you noticed for your business or for the industry as a whole?</p> <p>E.g. job creation, growth, pipeline of work, confidence in industry</p> <p>To what extent did other government initiatives separate to SHDF (including ECO or the Great British Insulation Scheme, the</p>		<p>Evaluation question headline question 9</p> <p>Contribution claim 7a, 7b</p> <p>Installer objective 3</p>

Theme	Question	Audience	Evaluation area
	Home Upgrade Grant), contribute to this?		
	<p>In what way, if at all, has the work on SHDF projects contributed to improvements in building standards and safety?</p> <p>To what extent did other government initiatives separate to SHDF (including ECO or the Great British Insulation Scheme, the Home Upgrade Grant), contribute to this?</p>		<p>Evaluation question 8.9</p> <p>Contribution claim 7b</p> <p>Installer objective 3</p>
	<p>In what way, if at all, have you noticed any changes in the level of interest or engagement from clients or potential clients for additional retrofitting measures as a result of the scheme?</p>		<p>Evaluation question 6.3</p> <p>Installer objective 4</p>
	<p>How has the SHDF impacted your future training priorities? How confident are you that the type of work you carried out on the SHDF project will be available in future? Are you looking to increase the availability of staff (either through taking on new employees or upskilling existing employees) for these activities? Why / why not?</p>		<p>Evaluation question 9.1-9.3</p> <p>Contribution claim 7a, 4b</p> <p>Installer objective 4</p>

Theme	Question	Audience	Evaluation area
	<p>Have the SHDF project(s) led you to change the way which you work in any way? This could be the way which you interact with customers and clients, communication with different members of the supply chain, types of installations undertaken, materials used. Why have you made these changes and how do they benefit your work?</p>		<p>Evaluation question 8.4</p> <p>Installer objective 4</p>
	<p>Have you noticed any negative impacts resulting from the SHDF on your business or the wider industry? What impact have they had? Who is this impacting? Has it affected your interest in future government schemes in any way, or in retrofit work more generally? Why?</p>		<p>Evaluation question 8.10</p> <p>Contribution claim 7c</p> <p>Installer objective 4</p>
	<p>Has your involvement in these SHDF works meant you've not done work elsewhere? What was this? Why did you make the decision to focus on SHDF works?</p>		<p>Evaluation question 8.9, 9.4, and 9.5</p> <p>Installer objective 4</p>
	<p>How do you think the SHDF could be improved to better realise its intended benefits?</p>		<p>Evaluation question 9.3</p> <p>Installer objective 4</p>

Theme	Question	Audience	Evaluation area
Broader view on government schemes and support options	How do you feel about government investment into energy efficiency schemes? Has it helped the industry develop? Why/ why not?	Principal contractors, retrofit coordinators	Evaluation question 9.4, 9.5 Installer objective 4
	Other than the SHDF, are you aware of any other government energy efficiency schemes that support your industry? To what extent have you been involved? How do you feel about the different schemes? Is there any difficulty responding to the different needs? Are there capacity issues responding to them all?		
	What challenges does the retrofit industry face in meeting the demand to decarbonise housing?		Evaluation question 9.3 Installer objective 4
	How could the retrofit industry be further supported?		

7.4 Qualitative data collection with stakeholders

Table 18: Topics covered in the TAF, DP, DA and DESNZ delivery team focus groups and interviews with senior DESNZ management

Section	Question	Audience	Evaluation question
Analysis lead only	What worked well from an analytical perspective in developing a robust	Senior DESNZ Management	Context to support analysis

Section	Question	Audience	Evaluation question
	economic case to support the Wave 1 business case?		
	What were the limitations or constraints in monetising key costs and benefits? What could have been improved?	Senior DESNZ Management	Context to support analysis
	If you were to put together the W1 economic case again, what would you change in the way you approached this? What were the key learnings?	Senior DESNZ Management	Context to support analysis
	How, if at all, did these learnings feed into the W2.1 business case?	Senior DESNZ Management	Context to support analysis
	What has worked well and what could be improved in the ongoing monitoring of benefits and costs?	Senior DESNZ Management	Context to support analysis
Learnings built into Wave 1	How, if at all, do you think lessons learnt or experiences from the SHDF(D) and/or other similar government schemes shaped the design and delivery of Wave 1?	Senior DESNZ Management	3.1, 3.4
Pre-competition/competition	To what extent do you think that the marketing of Wave 1 was successful in reaching and engaging SHLs? What, if anything, could be improved in this?	Senior DESNZ Management	1.2
	To what extent, did the successful bids match up to expectations of Wave 1 ambitions in terms of number, scale and profile?	Senior DESNZ Management	1.4
	How do you think the scheme design, application and appraisal processes influenced this (number and profile of successful bids)?	Senior DESNZ Management	4

Section	Question	Audience	Evaluation question
Competition process and support	What was the overall quality of the bids? Were there consistent strengths/weaknesses/gaps? What were the differences between successful and unsuccessful bids? In what ways, if any, was TAF support apparent in bids? Did any of the above vary by specific project/applicant types?	DP	1.4, 1.3
	How well did TAF build awareness of Wave 1 opportunities amongst SHLs?	IDT, TAF	1.2
	In what ways did TAF contribute to building awareness of the SHDF Wave 1 opportunity amongst SHLs? How effective do you think TAF's contribution was to this? Which methods were more effective? Did this reach all kinds of SHLs? Was timing of support early enough? What could be improved?	TAF	1.2
	What types of TAF support were most needed and used by Wave 1 applicants? How did this vary by project type?	TAF	1.3
	How well did the process of TAF's targeted support post self-assessments work? (Effectiveness, VfM)	TAF	1.3
	What worked well in TAF support? What could have	TAF	1.3

Section	Question	Audience	Evaluation question
	been improved? What gaps were there?		
	What were the impacts of TAF support for Wave 1 applicants? On their applications On their preparation for delivering the projects On delivery (if known) On Value for Money Examples?	TAF	1.3
	Was the TAF/SHRA sufficient to support these applications? What could have been improved? (Probe on support for consortia forming, time, bid writing, additional information to be provided to SHLs)	TAF, DP, IDT	1.3
	Do you feel the pre-application support from TAF was adequate to prepare the SHLs to deliver successful retrofit projects?	TAF, DP, IDT	1.1, CC2a
	Do you feel the scheme marketing was adequate to bring in the desired number and scope of projects to reach scheme goals?	IDT, TAF, DP	1.2
	How effectively did TAF support SHL in: A. Developing high-quality bids? B. Building capacity/capability to deliver projects? What could be improved?	IDT, Senior DESNZ Management	1.3
	Are you aware of any other sources of support that SHLs used in the application process other than that provided by SHDF?	IDT, TAF	1.3
	What worked well in the following processes, and	IDT, DP (not asked to TAF),	1.11

Section	Question	Audience	Evaluation question
	what could have been improved? Application processes Application appraisals Award/distribution of funding Mobilisation of TAF/DP	Senior DESNZ Management	
	To what extent did the types of applications received match expectations, in terms of: Scope Funding required Scale Number (of bids) Appropriate groups/SHLs Region Measure type Quality Why/why not? How did Wave 1 design influence this?	IDT	1.4
	Are you aware of any barriers faced by SHLs to making an application?	IDT	1.1
	What were the drivers and barriers to SHL applications to Wave 1? How did this vary by project/applicant type?	TAF (not asked to DP)	1.1
Delivery	What worked well in project mobilisation? What could be improved?	DP	1.5
	In project mobilisation, how effectively did the DP liaise/work with: DESNZ? TAF? What worked well and what could be improved? What were the barriers and how were they overcome?	DP	1.5
	How well prepared were the successful applicants for project delivery?	DP	1.3

Section	Question	Audience	Evaluation question
	How did this vary by project type?		
	What lessons have been identified from Wave 1 in relation to the DP's involvement in application appraisal processes and project mobilisation? How were these captured? Are you aware of any changes being implemented as a result?	DP	1.11, 1.5
	What worked well in SHRA/DP/DA support to project delivery? What difference has it made? What could be improved?	IDP	1.5, 1.6 - 1.11 3.1-3.4
	What worked well or could be improved in the project monitoring process? (Including risk management, views on quality of delivery and installations)	DP IDT, DA	1.114.2, CC2a
	How well did the internal management between DESNZ and delivery sub-contractors work? Could anything be improved?	TAF, DP, DA, IDT	1.11
	Was there enough time/funding/support to carry out the work?	DP, IDT, TAF	4.5, 4.6, 4.8
	How did scheme design factors affect the delivery and installations? (e.g. requirements for prioritising fabric first measures, hardest-to-treat approach, use of PAS2035 certified installers, low carbon heating, eligibility type, minimum co-funding, delivery period, etc)	DP, IDT, TAF, Senior DESNZ Management	4.1-4.6, 4.9, 1.9, 8.3, 8.7-8.10

Section	Question	Audience	Evaluation question
	What key factors enabled successful scheme delivery?	Senior DESNZ Management	1.5, 2.3, 2.5
	Overall, to what extent do you think Wave 1 projects have delivered as intended? What key differences/variations have there been by project type?	IDT, Senior DESNZ Management	2.1, 2.2
	What do you think have been the enabling factors in successful project delivery?	IDT, DP, Senior DESNZ Management	2.3
	What do you think have been the barriers to successful project delivery? Did these vary by project type? How did projects overcome these? Why did some projects drop out?	IDT, DP, Senior DESNZ Management	2.3
	What, if any, actions are you aware of that SHDF team has been able to take to facilitate installation supply chain capability and capacity to support project delivery? Probe for: Intervention to address issues Coordination/competition with other government energy performance schemes	Senior DESNZ Management	1.9 important for CC 4a, 9.4, CC5b
	What actions has the IDT taken to facilitate retrofit supply chain capability and capacity to support Wave 1 project delivery?	IDT	
	What, if any, enablers and barriers are you aware of to supporting the capability and capacity of the retrofit supply chain?	IDT	2.3

Section	Question	Audience	Evaluation question
	How effective was the Wave 1 engagement with supply chain for project delivery?	Senior DESNZ Management	2.5
	How effective has the DP been in fulfilling their role in Wave 1? Why/why not? What worked well? What could be improved? Were there gaps that suggested the need for a Delivery Agent (DA)?	IDT	1.6, 1.8
	How did the DP support projects? What was most useful and why? With what impact? How did this vary across projects?	DP	1.6, 1.8
	How effective has the DP been in fulfilling its remit? What has worked well and what could be improved?	Senior DESNZ Management	1.5, 1.6, 1.8
	What could have been improved or extended in the DP support provided to projects?	DP	1.6, 1.8
	What has worked well or what could be improved in terms of overall Wave 1 scheme management by DESNZ? Probe for: Commissioning and management of the DP Risk management Scheme governance Efficiency of management and contracting	Senior DESNZ Management	1.5, 1.11
	How effective was Wave 1 scheme management in terms of processes/structures and DESNZ oversight? Why/why not? What worked well? What could be improved?	IDT	1.5

Section	Question	Audience	Evaluation question
	How well have mechanisms worked to capture learnings and knowledge for future waves?	IDT, Senior DESNZ Management	1.5, 3.1, 3.2
	Are you aware of any changes that have been implemented as a result of lessons learnt? With what impact?	IDT	1.5, 3.1, 3.2
	What other sources of support did the SHLs use to deliver their projects?	DP, Senior DESNZ Management	2.5
	Overall, how well have the projects been able to meet their expected delivery plans? In terms of: Timing Scale Scope Costs Resident experience How has this varied between projects?	DP Post	2.1
Scheme management	How well did project reporting work? -How has the reporting contributed to understanding of scheme progress and delivery? And design of the next wave(s)? What could be improved?	DP	1.5
	How well have other scheme processes worked? Why/why not? What could be improved?	DP	1.5
	What has worked well in the relationship and communications between DESNZ and the DP? What could be improved?	DP	1.5
	How have lessons been captured? How have these been shared and applied? With what impact? (DP)	DP	3.2

Section	Question	Audience	Evaluation question
	What, if any, lessons from the SHDF(D) were built into Wave 1? With what impact? (IDT)		
	How did TAF liaise/work with the other organisations delivering SHDF? What worked well, what could be improved?	TAF	1.3
	What, if any, lessons were identified from Wave 1 in relation to TAF and supporting SHLs? How were these captured? Are you aware of any changes being implemented?	TAF	1.3
	Are you aware whether the SHRA website and resources were also used during project delivery? If so, how and what impact did these have?	TAF	1.3
Early outcomes and impacts	In what ways do you think the scheme has performed well or not so well in terms of outcomes and impacts? Why?	All	6.6, 7.1-7.3
	Have there been any unintended or unexpected positive or negative outcomes from the project/scheme?	All	8.10 9.1-9.5
	What else is driving or supporting the decarbonisation of social housing?	All	5.9
	What are key variations in outcomes and impact by SHL type, including by type of organisation, size of stock and nature of stock?	DP, IDT	2.2, 6.4

Section	Question	Audience	Evaluation question
	Is Wave 1 on track to deliver its goals/targets for: Energy efficiency improvements EPC upgrades Scale If not, what are the main reasons for this? How is this being measured and monitored? What have been the advantages/disadvantages of this?	IDT, Senior DESNZ Management	2.1
	How and why is the profile of installations expected to have changed?	IDT	2.1
	To what extent, overall, do you think the scheme will be successful in delivering broader intended impacts, for example for residents, including those which are non-monetisable? How has the design of the scheme influenced this?	Senior DESNZ Management	4.1-4.9
	What evidence are you aware of showing that the scheme has been successful in delivering broader intended impacts? How do you think the design of the scheme affected this?	IDT	
	To what extent, do you think Wave 1 has provided evidence and learning about the deliverability of retrofit at scale? Has this been shared, and if so, how?	IDT, DP, Senior DESNZ Management	3.1, 3.3
	What evidence, if any, are you aware of that Wave 1 has led to or is expected to lead to future economies of scale in retrofit?	Senior DESNZ Management	8.1

Section	Question	Audience	Evaluation question
	To what extent, do you think W1 installations have offered Value for Money?	IDT, DP	8
	What variations, if any, are you aware of in Value for Money within Wave 1 project delivery? For example, by measure type and mix, archetype, region?	Senior DESNZ Management	8.2
	To what extent, are you aware of SHLs focusing upon the hardest-to-treat properties and how has this affected Value for Money?	Senior DESNZ Management	8.3
	What innovation, if any, are you aware of within Wave 1 retrofits? How has this affected Value for Money?	Senior DESNZ Management	8.4, 8.5
	What evidence, if any, are you aware of that Wave 1 has affected building standards and safety?	Senior DESNZ Management	8.9
	What, if any, negative impacts are you aware of from Wave 1?	IDT, DP	
	What evidence, if any, are you aware that Wave 1 experience has increased SHL capacity and capability to deliver retrofit work on their stock?	DP	6
	What evidence are you aware of that demonstrates Wave 1's contributions to broader intended impacts?	DP	9
SHL Outcomes	To what extent, do you think SHLs have developed skills and resources through participation in Wave 1?	Senior DESNZ Management	6.2
	Are you aware of how SHL participation in Wave 1 has contributed to SHLs' future plans for social housing	Senior DESNZ Management	6.3, 6.4

Section	Question	Audience	Evaluation question
	retrofit? If so, how? How has this varied by type of SHL?		
Supply Chain outcomes	What evidence, if any, are you aware of that Wave 1 has contributed to development of the supply chain?	Senior DESNZ Management	9.1, 9.2
	Is this over and above the contribution of other government schemes?	Senior DESNZ Management	9.5, CC7b
	What barriers, if any, are you aware to capability and capacity building in the supply chain?	Senior DESNZ Management	9.3
Additionality	To what extent, do you think anticipated future changes such as regulation of energy performance of social housing are likely to reduce the necessity or impact of Wave 1? Why?	Senior DESNZ Management	7.7

7.5 Qualitative data collection with SHLs

Table 19: Topics covered in SHL interviews

Section	Question	Evaluation questions	Audience
Pre-Application	Please could you describe your role and involvement with Wave 1 of SHDF?	Context to support analysis	All
	Please tell me about any other retrofit or energy performance installations prior to SHDF that your organisation carried out or planned to carry out. If had prior plans in place, why was SHDF needed? How is this funded/how would this be possible	5.9, 6.1, CC 1a, 1b	Applicants

Section	Question	Evaluation questions	Audience
	<p>without this government support? How have Wave 1 retrofit plans differed due to the funding available? (probe on: scale, timing, quality)</p> <p>Had your organisation carried out or planned to carry out any retrofit or energy performance installations prior to your engagement with Wave 1 of SHDF? (unsuccessful applicants only)</p>		
	<p>How did your organisation/the consortium first hear about the Wave 1 funding opportunity?</p>	1.2	All
	<p>What were your organisation's/consortium's motivations for applying for Wave 1? What encouraged you/put you off? (including scheme design characteristics)</p>	1.1, 4.1-4.9	Applicants
	<p>Was there anything that made applying to Wave 1 less appealing or challenging to comply with?</p>		Applicants
	<p>How did the scheme design affect the nature of your application?</p>	4.1-4.9	Applicants
	<p>[If the interviewee had existing retrofit plans at the time of application] How, if at all, did your organisation/consortium's retrofit plans change as a result of SHDF W1 funding availability?</p>	4.1-4.9	Applicants
	<p>[if the interviewee did not have existing retrofit plans at the time of application] How did the Wave 1 scheme design</p>	4.1-4.9	Applicants

Section	Question	Evaluation questions	Audience
	influence the nature of the retrofit project proposed in your application?		
	Has your consortium/organisation accessed any other government funding to carry out additional energy performance improvements on the same housing stock? Did the Wave 1 application or funding have any influence upon this?	5.9	Successful applicants only
Engagement with SHRA	What were your consortium/organisation's motivations for early engagement with the SHRA over the Wave 1 opportunity?	1.1	Non-applicants
	Please could you describe the nature of your engagement and interaction with Wave 1 of the SHDF?	1.3	Non-applicants
	What, if anything, was helpful about your engagement with? Probe for: Topics covered Mode of delivery Level of detail Applicability	1.3	Non-applicants
	What, if anything, could be improved about the SHRA support? Probe for: Topics covered Mode of delivery Level of detail Applicability	1.3	Non-applicants

Section	Question	Evaluation questions	Audience
	What else would have been helpful?		
	What, if anything, did your consortium/organisation learn as a result of your interaction with SHRA?	1.3	Non-applicants
Application	What worked well or could be improved in the application process?	1.1	All
	Did your consortium/organisation access SHRA support for help completing the application? If yes, how did SHRA help your consortium/organisation put together your application and plan your project? Please give examples. If no, why not?	1.3, 1.4, CC2a	Applicants
	Were there any gaps in SHRA support? What could be improved about SHRA support?	1.3	Applicants
	Did your consortium/organisation use any other sources of support and information to complete your application? Please give examples of how these supported your application.	1.3, CC2b	Applicants
	Did you understand why your application was not successful? Was the assessment process transparent? What, if anything, would you change or improve about the assessment process?	1.3	Unsuccessful applicants
	What, if anything, did your consortium/organisation learn as a	1.3	Unsuccessful applicants

Section	Question	Evaluation questions	Audience
	result of the application and assessment process? What would you do differently if you applied again?		
	If your Wave 1 application had been unsuccessful, to what extent do you think your consortium/organisation would have been able to continue with your retrofit plans? How would these have been funded? How would the retrofits have differed, if at all, in terms of scale, scope, mix of measures, etc.?	6.1, CC1a-c	Successful applicants
	How prepared did your consortium/organisation feel to carry out the work? Why?	1.3	Applicants
Application decision-making	What point did you reach in applying for Wave 1 of SHDF?	1.1,1.2	Unsuccessful applicants
	Why did you decide not to make an application?	1.1,1.2	Unsuccessful applicants
Retrofit activity since engagement with SHRA/the W1 application	Has your consortium/organisation carried out or planned to carry out any retrofit or installations of energy performance measures in the absence of SHDF funding? [If yes] Probe for: Scale / scope (including inclusion of clean heat) Timing Quality	6.1	Non-applicants

Section	Question	Evaluation questions	Audience
	<p>Internal resource allocated to project</p> <p>Influence of other government schemes contributing to clean heat deployment and government policy on clean heat</p> <p>Influence of expectations about future energy performance regulations</p> <p>Any other sources of support used</p> <p>[If yes] How is this funded/how would this be funded?</p> <p>[If no] Why not?</p>		
	<p>Has your consortium/organisation carried out or planned to carry out any retrofit or installations of energy performance measures in the absence of SHDF funding?</p> <p>[If yes] How does this differ to what you proposed in your application for Wave 1?</p> <p>[If yes] How is this funded/how would this be funded?</p> <p>[If no] Why not?</p>	6.1	Unsuccessful applicants
	<p>[If installations have been started] What have the outcomes been from this?</p>	6.1	Unsuccessful and non-applicants
Project delivery, including:	<p>For each of the following please could you discuss how this progressed and factors that you think enabled success or were challenges, and how those were overcome:</p>	2.3, 2.5, 2.1, 2.2, 2.3, 2.4, 1.9, 4.1-4.9	Successful applicants

Section	Question	Evaluation questions	Audience
- Engaging with Supply chain - Resident engagement - Interaction with stakeholders - Post-installation support	Project planning and preparatory work Overall project management and delivery Resident engagement Installation supply chain procurement and management Post installation support	CC5b	
	(If not answered with each point) How did your consortium/organisation overcome these challenges?	2.3	Successful applicants
Consider variation within projects e.g. by stock type, resident profile	On procurement specifically, how well was your consortium/organisation able to keep costs down in the procurement, management and use of the required inputs for installations (e.g. the installers, the materials needed)? Why and how?	2.3	Successful applicants
	With regards to resident engagement, to what extent, did your consortium/organisation experience any resident drop out?	2.1	Successful applicants
	In addition to what has been already raised, did your consortium/organisation observe any variation within your project in terms of successes and challenges?	2.2	Successful applicants
	How did your consortium/organisation find the project monitoring process implemented by DESNZ? What worked well or could be improved?	1.11, 4.2	Successful applicants

Section	Question	Evaluation questions	Audience
	<p>How did SHRA/DP support project delivery?</p> <p>How, if at all, did the DP (Ricardo)/SHRA support facilitate project delivery? If yes, how did this help effective delivery of the project?</p> <p>What additional support, if any, did your consortium/organisation need from DESNZ /DP?</p>	<p>1.8, 1.5, 1.6, 1.9, 1.10, 1.11</p> <p>3.1-3.3, CC2a,4a</p>	<p>Successful applicants</p>
	<p>Is your consortium/organisation using or did your consortium/organisation use other sources of information or support to carry out the projects and install the measures? Are you using/did you use other sources for information or support to carry out the projects and install the measures?</p>	<p>2.5, 6.5, CC2b</p>	<p>Successful applicants</p>
	<p>In your opinion, did your consortium/organisation have sufficient resources to carry out the intended work, such as time and funding? Was the required split of funding appropriate?</p>	<p>4.5, 4.6</p>	<p>Successful applicants</p>
	<p>How did scheme design, including PAS 2035 requirements, influence the delivery and final installations? (E.g. requirements for prioritising fabric first measures, hardest-to-treat approach, use of PAS2035 certified installers, low carbon heating, eligibility type, etc.)</p>	<p>4.1-4.4, 4.9, 1.9, 8.3, 8.7-8.10</p>	<p>Successful applicants</p>
	<p>As a result of the scheme, do you think the cost of the retrofits your consortium/organisation is carrying out has increased or decreased compared</p>	<p>8.1</p>	<p>Successful applicants</p>

Section	Question	Evaluation questions	Audience
	to your original baseline/forecast? Do you expect this to increase or decrease for near term future retrofit projects? Why?		
Anticipated outcomes and impact	What learning opportunities has Wave 1 provided you with? How has participating in Wave 1 developed your skills and capacities?	CC3a, 6.2	Successful applicants
	What kinds of benefits have you seen from the scheme in terms of your housing stock? (Probe on: building standards and safety, financial value, reduced retrofit costs through economies of scale)	5.9, 6.6, 7.1-7.3,8.1, 8.9 CC5a	W1 projects
	Were any innovative approaches incorporated or developed in project delivery? What benefits have this led to?	8.4, 8.5	Successful applicants
	Does your consortium/organisation have future plans for further retrofit? (Probe on motivations/barriers, learning from Wave 1, scale/scope, private financing, inclusion of clean heat, skills taken from Wave 1) If no, why not?	3.2, 6.2, 6.3, CC3a, 3c, 10a, 10c	Successful applicants
	Do you feel confident about undertaking future retrofit?	6.2, 6.3, CC3a	All
	In addition to anything already covered, how has participating in Wave 1 developed your organisation's skills, capacities and confidence to	CC3b,8b,10 b	All

Section	Question	Evaluation questions	Audience
	<p>carry out retrofit projects? Please give examples including learnings.</p> <p>This could include learning from direct project experience, from other SHLs, from the DP/DESNZ, etc.</p> <p>What else has enabled you to build skills, capacity and confidence in undertaking future retrofit? (Probe on other government support including for clean heat.)</p>		
	<p>Has your consortium/organisation shared your learnings on retrofit (at scale) with others in and outside of Wave 1 (e.g. other LAs or housing associations, other private landlords, housing representative organisations etc.)? If so, how?</p>	6.2	Successful applicants
	<p>What else has enabled your consortium/organisation to build skills, capacity and confidence in undertaking future retrofit? How has this contribution differed to that made by SHDF Wave 1?</p>	6.2	Successful applicants
	<p>What impacts have the retrofit projects had for residents (both positive and negative)? What impacts have there been for residents? (Probe on: comfort, health, well-being, pride in place and causal mechanisms for change)</p> <p>How have other external factors influenced this? (Probe on high energy prices, inflation, cost of living) How are you aware of these changes?</p>	CC12a, 12b	Successful applicants

Section	Question	Evaluation questions	Audience
	To what extent, did these outcomes relate to the energy performance measures themselves or any accompanying other upgrades to their property, such as redecoration undertaken as a necessary part of the installation of energy performance measures?	5.9	Successful applicants
	How have other external factors influenced any potential outcomes on residents?	5.9	Successful applicants
	What kinds of benefits has your consortium/organisation seen from the scheme in terms of your housing stock?	8.9	Successful applicants
	<p>If the SHL has used other government funding for other energy performance improvements in the same stock as improved by SHDF:</p> <p>Please can you explain what the different contributions of the distinct funding and SHDF funding have been to outcomes from energy performance measures? For example, on overall energy reductions.</p>	5.9	Successful applicants
	What, if any, other positive or negative outcomes has the project or Wave 1 scheme had, including anything unintended or unexpected?	8.10, 9.1-9.5	Successful applicants

Table 20: Topics covered in the SHL focus group

Section	Question
Introduction	<p>Includes:</p> <ul style="list-style-type: none"> Research background Data protection and how their data will be used Confirmation of name and position Consent to take part and permission to record
Hard-to-treat properties	<p>Which homes do you consider hard-to-treat within your respective Wave 1 projects, and why?</p> <p>Why and how did you select these hard-to-treat homes for your projects?</p> <p>How were the energy saving measures selected for these hard-to-treat homes?</p> <p>What were the considerations for fabric first approaches vs clean heat?</p> <p>What have been the effects of these choices?</p> <p>When were hard-to-treat property installations undertaken within projects (first, last, other)? Why?</p> <p>What were the key enablers/successes of the retrofit work among these homes?</p> <p>What were the main barriers to the retrofit work among these homes? How and to what extent were these overcome?</p> <p>What were the key lessons learned from experiences within SHDF Wave 1 with hard-to-treat homes?</p> <p>Are you sharing these lessons with other SHLs/Supply chain/others? If so, how?</p>

Section	Question
	<p>Has this work through SHDF Wave 1 enabled you to make plans/take up future retrofit of hard-to-treat homes?</p> <p>Please give examples.</p>
PAS 2035	<p>How have PAS 2035, Trustmark and MCS requirements impacted retrofit work (on all stock) including in terms of:</p> <p>Quality of installations</p> <p>Ability to retrofit at scale, on time and on budget</p> <p>Procuring and managing the supply chain</p> <hr/> <p>How did this vary by property and measure type?</p> <p>Choice of measure, fabric-first, clean heat</p> <p>Rural/urban, hard-to-treat, tenure type, etc.</p> <hr/> <p>Are you aware of any increase in certifications in the supply chain to support SHDF Wave 1 projects?</p> <hr/> <p>What factors enabled or hindered your ability to adhere to PAS 2035 requirements? How were these mitigated?</p> <hr/> <p>What, if any, capabilities and capacities have been developed as a result of applying PAS 2035 requirements in your projects?</p> <hr/> <p>To what extent, do you expect to apply PAS 2035 or learnings arising from this in other/future retrofit work?</p>

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