



Retrofit for the Future Summative Assessment - Phase 2 Report

A Final Report by Hatch
May 2023

Sefton Metropolitan Borough Council

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Executive Summary

- i. Hatch was appointed to undertake the summative assessment of the Retrofit for the Future (RFF) project. The accountable body (Sefton Council) is required by the European Region Development Fund (ERDF) grant funding agreement to submit a summative assessment as part of the project closure procedure. This report is the formal output from the summative assessment research and analysis.
- ii. RFF was a £5million project, part funded by the ERDF as part of the European Structural Investment Funds (ESIF) Growth Programme . RFF received over 50% public match funding. The project was led by Sefton Metropolitan Borough Council (SMBC) and delivered through the following three Housing Association delivery partners: Torus 62 (Torus) (formerly Liverpool Mutual Homes), One Vision Housing (OVH) and Magenta Living (Magenta). The project was officially launched in November 2018 and by March 2022 the installations were complete and capital was fully claimed. A final claim was submitted at the end of March 2023 that was largely associated with the aborted Phase 2 of the project and so full financial completion occurred at the end of March 2023.
- iii. The summative assessment adopts an approach which is consistent with the requirements of the ESIF Programme and Government and other associated guidance.
- iv. These requirements have been met through an evaluation methodology which has used a combination of quantitative and qualitative research methods. The summative assessment draws on a variety of information including:
 - Analysis of GHG emissions data
 - In depth consultations with project stakeholders
 - A postal survey of recipient residents of the RFF project
- v. It should be noted that the project was significantly disrupted due to the restrictions imposed by the UK Government as a result of the Covid-19 pandemic.

Project Relevance

- vi. The project was highly relevant. There was a clear need for the project and there is a clear logic chain and theory of chain sitting behind the project and it addresses a number of market failures.
- vii. The project had a strong project design which met the needs of residents receiving the RFF project providing energy efficiency measures as well as behavioural change delivery.
- viii. The rationale for the project was based on positive externalities that would be achieved by the project, information failures, split incentives, market power and economies of scale and coordination failure.
- ix. The project became increasingly aligned with policy priorities which emphasise the importance of energy efficiency improvements.

Progress Against Contractual Targets

- x. Based on monitoring and claims data that has been provided, 90% of the expenditure target was spent. The project performed well against the reprofiled (in the second PCR) cumulative targets. Reductions in GHG emissions (C34) have exceeded targets, and the number of households with improved energy consumption (C31) stood at 88% of the project target (within the accepted 15% variance).
- xi. RFF's activity end date was extended to allow time for the remaining contracted outputs to be achieved in light of the project delays due to Covid-19.

Delivery and Management Performance

- xii. Consultations with delivery staff found that the project management and governance systems and processes were effective and that the partners worked well together. There were robust systems in place for communication between partners that facilitated the successful delivery of the project.

Residents perspective

- xiii. A number of residents, particularly more vulnerable residents, had concerns about the spread of Covid-19 and therefore refused access to their properties for work to reduce their risk. A variety of marketing activities have been undertaken to engage residents and disseminate lessons learnt with local stakeholders and those designing similar policy initiatives.
- xiv. Responses to the survey indicated that the level of communication with residents throughout the retrofit process had an influence on overall resident satisfaction. Given that a large proportion of beneficiaries were older residents it was important that communication was accessible and available through a range of sources. The management of expectations for what retrofit measures will deliver and when is also important, given the time it may take for benefits to be realised. This is particularly the case where residents felt the RFF services were disruptive or intrusive.

Economic Impacts and Return on Investment

- xv. The evaluation has identified a significant impact, including a reduction in annual GHG emissions levels to date, which is expected continue in future. It is estimated the project will generate net additional GVA of £0.63m from reduced GHG emissions. It is important to note these impact estimates should be taken only as indicative estimates. In addition to the quantified economic benefits there will also be a number of important wider benefits that have not been captured quantitatively (such as fuel poverty alleviation and aesthetic improvements).
- xvi. It is estimated that the £2.25m ERDF investment in RFF will support a net additional lifetime economic return on investment (based on GHG reduction alone) of £0.28 for every £1 invested and an ERDF investment of over £5,000 per property¹. The 2016 DCLG Appraisal Guide suggests that anything exceeding a £2 return on public investment for every £1 invested represents high value for money. On this basis, these estimates of RFF's net additional return on public investment would be judged as low. However this measure does not capture a number of other

¹ Total cost of project divided by number of projects that received the interventions.

benefits which are difficult to monetise in a robust way, including potential health benefits, improvements to aesthetics and reduction of fuel poverty. This means assessing the overall return on public investment is highly challenging. In reality, the actual value for money would be significantly higher than is reflected in the £0.28 per £1 noted above. When accounting for the wider benefits it is estimated that the overall value for money of the project will be judged as medium in the long run.

Lessons

- xvii. The evaluation identified 10 lessons for the grant recipient, those designing similar interventions and policy makers:

Lesson 1: Importance of reviewing relevance and consistency to ensure project design continues to align with policy aspirations.

Lesson 2: The importance of carrying out a thorough assessment of risks at the early stage of project design and ensuring the project is well designed to mitigate against any potential risks identified.

Lesson 3: Ensuring adequate handovers are carried out ahead of staff departures and new staff members are briefed on the project context, progress, challenges encountered to date and the levels of communication expected for the project.

Lesson 4: Pre-site surveys can help to identify any issues that may prevent installation and mitigate against the risk of selecting properties that are less suitable for interventions.

Lesson 5: Importance of integrating best practice and lessons learnt into future delivery. This could include delivering a whole house scheme, expanding the implementation of monitoring sensors and implementing them earlier on, incorporating private accommodation as well as housing associations, and utilising offsite manufacturing.

Lesson 6: Allowing flexibility to adapt the project to ensure it continues to respond to changes.

Lesson 7: It is not sufficient to install retrofit measures to improve energy efficiency without also delivering behavioural change activities alongside these improvements. Behavioural change activities can support residents to understand how the new measures work, and to encourage them to alter their behaviour to ensure that the new measures result in energy efficiency gains.

Lesson 8: Communication with residents throughout the retrofit process is essential to resident satisfaction. This includes the consultation phase, the notice period for the works, day-to-day information regarding the works and follow-up information about the new measures implemented. The choice of contractor is also important where noise and untidiness affects overall satisfaction with the retrofit measures.

Lesson 9: Innovation is an important consideration going forward for all parties involved in the design process of schemes similar to RFF and the funding systems they operate in. There is a continuing need for social landlords to implement energy efficiency treatments if this sector is to make a major contribution to reducing climate change. Setting targets for social landlords (as has been done with the 2030 EPC banding targets) and then putting in place appropriate targeted financing mechanisms (where the cost of measures can't be recouped by the landlords through reduced bills) should be one of the main mechanisms for achieving this. Implementing these treatments at scale may help to reduce costs and to innovate.

The UK Government needs to consider if future economic development programmes, like the future Shared Prosperity Fund, are an appropriate mechanism for this type of energy efficiency investment targeted at social housing. The absence of the scope now to match EU with UK resources may mean that there are better funding and delivery mechanisms than through mainstream economic development programmes.

There is the related consideration of whether ED programmes are a suitable mechanism for more innovative actions. The experience of the RRF project is that the innovative elements have been more challenging to both fund and deliver, which appears to be a common emerging message across similar ERDF funded projects. Phase 3 of the national evaluation will be considering this issue.

Lesson 10: Given the increased focus in national and local policy on the need for retrofit activity, and the significant investment committed to similar upcoming schemes, it is important for existing schemes such as RFF to disseminate lessons learnt and examples of best practice that other grant recipients and policy makers can draw on in designing future schemes.

1. Introduction to the Commission

- 1.1 In 2019 Hatch were appointed by SMBC to undertake a Summative Assessment of the ERDF RFF project. The RFF project has been operating across the Liverpool City Region (LCR) since July 2018 and phase 1 of the project was completed in March 2022. This report is the formal output from the Summative Assessment.
- 1.2 Under RFF, three Housing Associations (HAs), Torus (formerly Liverpool Mutual Homes), OVH and Magenta, delivered thermal and energy efficiency measures to 445 homes spanning seven schemes in Liverpool, Sefton and Wirral. RFF was led by SMBC and a Steering Group organised through Viridis, an organisation that operates across Merseyside to support reductions in household energy use.
- 1.3 RFF also delivered support for residents. The purpose of this support was to ensure that residents understand how best to use the energy efficiency products and measures that were installed. The support included provision of information packs, workshops and events and was intended to be delivered in co-ordination with local stakeholders.
- 1.4 The total project value as outlined in the project's full ESIF application form is £5.28 million. This consists of £4.83 million (91%) capital and £0.45 million (9%) revenue. ERDF funding covers £2.38 million (45%) of the project costs, with the remaining £2.90 million (55%) funded through the delivery partner housing associations.
- 1.5 The RFF delivery phase was originally scheduled to run to 31st December 2020, with financial close down by 28th February 2021. However, the impacts of the Covid-19 pandemic caused the respective dates to be pushed back. The final practical completion data was updated to 31st March 2022 and then was delayed for a further year to March 2023. The full set of project milestones, pre and post PCR are shown in Table 1.1 below.

Project Milestones	Initial Project Milestones Dates		Change in Project Milestones Dates	
	Start Date	Completion Date	Start Date	Completion Date
Project Start Date & Delivery Team In place	1 st Jul 18	1 st May 19	No change	
Delivery Partners Agreements signed	6 th March 19	6 th March 19		
Schemes finalised and bespoke solution reached	1 st Oct 18	29 th Feb 20		
Planning Permission/Consents	1 st Oct 18	29 th Feb 20		
Tendering processes start	1 st Aug 19	31 st Mar 20	No change	31 st Oct 20
Schemes start on site	1 st Dec 19	31 st May 20		1 st Nov 20
Financial Completion Date	31 st Dec 20	28 th Feb 21		31 st Mar 23
Project End Date	28 th Feb 21	28 th Feb 21		31 st Mar 23

Source: RFF Management Team

Evaluation Approach

- 1.6 The purpose of conducting a Summative Assessment is to gain an independent understanding of the project performance, impacts and value for money, in addition to exploring the mechanisms through which these impacts have been achieved and insight into which delivery approaches work and why. This includes reviewing any examples of best practice, challenges experienced and lessons which can be applied in future projects.
- 1.7 The evaluation adopts an approach which is consistent with the requirements of the ESIF Programme and associated guidance. The Ministry of Housing Communities and Local Government (MHCLG) has provided guidance on the preparation of the Summative Assessment which states that the report must cover the following five themes.
- **Project Context and Relevance:** a review of the project design and context which explores all aspects of the project's intervention logic and market failure rationale.
 - **Changes to Delivery Context:** a review of the project's continued relevance and consistency in light of changes to the socioeconomic and policy context since the project was designed.
 - **Progress against the project's contractual targets:** considering performance against expenditure profile, output targets and horizontal principles, and identifying the underlying factors which have contributed towards under / over-performance.
 - **Experience of delivering and managing the project:** analysis of the effectiveness of project implementation to build a picture of how the project was delivered and managed, identifying what has worked well and less well.
 - **Analysis of outcomes and impacts attributable to the project:** providing a summary of project impacts (eg emissions abatement), drawing on qualitative insights from project beneficiaries and setting out the extent to which additionality is being achieved.
 - **Cost effectiveness and value for money:** an assessment of the return on investment associated with the project.
- 1.8 These are tailored to the project context and all strands of research are synthesised to develop well-evidenced conclusions and lessons. These requirements have been met through an evaluation methodology which has used a combination of quantitative and qualitative research methods. The approach to both phase 1 and phase 2 evaluations is shown below:

Interim Phase

- 1.9 Hatch undertook an interim phase of the evaluation. This was completed in April 2020. The interim report provided an initial summary assessment of:
- the project offer
 - the on-going strategic and economic rationale for the project and theory of change (ToC)
 - progress made against the seven RFF schemes, challenges faced and implications for delivery across the remainder of the project lifetime
 - a review of the approach to baseline and the forecasting of the energy performance certificates (EPC) and greenhouse gas emissions (GHG) produced by target dwellings, before and after retrofit measures have been deployed.

- 1.10 The interim evaluation also outlined the approach and key lines of enquiry for the Phase 2 summative assessment.

Phase 2 Evaluation

- 1.11 The Phase 2 evaluation primarily focuses on process evaluation, theory-based impact evaluation and value for money assessment. This approach is consistent with the ERDF summative assessment guidance². Counterfactual impact evaluation methods were not considered appropriate, given the availability of data to determine a credible counterfactual case, the budget and resources available to undertake this evaluation.

- 1.12 Theory-based approaches are centred around a well-defined theory of change and enable us to analyse the project's impacts by reviewing and testing the causal chains thought to bring about change. Multiple evidence sources will be used to test the validity of assumptions underpinning the causal chains, helping to determine the extent of the change, why it occurs and the likelihood of desired outcomes materialising. The Phase 2 Evaluation:

- Updates the project's strategic context, logic model and theory of change, and review the continued relevance and consistency in light of changes to economic and political context.
- Updates the assessment of progress against contractual spend and output targets, it also considers contributions towards the horizontal principles.
- Presents analysis of the responses to a resident postal survey which was undertaken as part of the evaluation.
- Presents a delivery and management review which draws on consultations with a range of stakeholders, including the housing associations, SMBC, LJMU and MHGLG.
- Delivers a best practice review, which examines a sample of similar projects and wider evidence on retrofit best practice and emerging developments in retrofit technology and solutions.

- 1.13 Additionally, the Phase 2 report presents an impact assessment which covers the following types of impacts:

- **Quantitative assessment of the potential for reduced energy and bills** – an assessment of the effect of changes in EPCs on energy use, through combining information on dwelling type and resident type/numbers with benchmark data on energy use. The assessment uses the Standard Assessment Procedure. The assessment also uses monitoring data captured by LJMU project within the project timescale.
- **Qualitative assessment of resident perspectives about the effect of RFF measures on energy usage** – drawing on the findings of the resident survey, which was undertaken as part of the phase 2 evaluation.
- **Quantitative assessment of GHG abatement and monetary value of this** – drawing on the baseline and the final assessment of GHG emissions to estimate net reduction brought about as result of the project, using benchmark measures (such as shadow price of carbon) to assess monetary value.

² assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/795499/ESIF-GN-1-033_ERDF_Summative_Assessment_Guidance_v3.pdf

- **Fuel poverty alleviation** – use of a resident survey to gauge fuel poverty experienced before and after RFF were measures installed. This relies on a qualitative assessment, the survey asked residents to respond using a scale, on the degree to which their energy bills have been reduced, and if this is likely to notably affect the proportion of their income spent on energy.
- **Resident comfort and wellbeing** – a qualitative assessment based on the resident survey, disaggregating the results based on resident type.
- **Housing aesthetic** – a qualitative assessment based on the resident survey regarding the effect of RFF investment on improvement/deterioration of housing.
- **Housing association benefits** – a qualitative assessment based on consultation with HA delivery partners, exploring benefits of owning more energy efficient stock and in terms of wider perceptions and regeneration of local area.

1.14 The assessment also considers the counterfactual, rebound effect and assumptions around persistence of cost savings and wider benefits.

Structure of the Report

1.15 The Phase 2 evaluation is structured around the following topics:

- **Section 2. Project Context and Relevance** – Provides an update to the project’s strategic context, logic model and theory of change, reviewing the continued relevance and consistency of the project in light of changes in political and economic circumstances.
- **Section 3. Changes to Delivery Context** - Provides a brief analysis of key changes in the economic and policy context, which have been relevant to the RFF project, impacted on the original rationale or caused the shape of operational delivery to change.
- **Section 4. Best Practice Review** – Draws on a sample of similar projects and wider evidence on best practice and emerging developments in retrofit technology and solutions to provide a comparative assessment.
- **Section 5. Progress against Contractual Targets** – Considers the progress with programme implementation against the expenditure and output targets and contributions towards the horizontal principles.
- **Section 6. Delivery and Management Performance** – Provides a qualitative analysis of the programme’s delivery performance and implementation, and considers the elements of programme delivery which have worked well and less well.
- **Section 7. The Resident Perspective** – Draws on the resident survey to assess resident experience in terms of engagement with the programme, experience through the period in which measures were deployed and expected and actual benefits gained.
- **Section 8. Outcomes and Impacts** – Sets out the progress made towards the outcomes and impacts set out in the programme’s logic model, including an. Provides an assessment of the programme’s value for money, drawing on the impact analysis.
- **Section 9. Conclusions and Lessons** – Outlines the conclusions which can be drawn from the evaluation and the lessons learned from programme delivery which may be used by interested groups of people including policy makers and those designing and implementing similar programmes in the future.

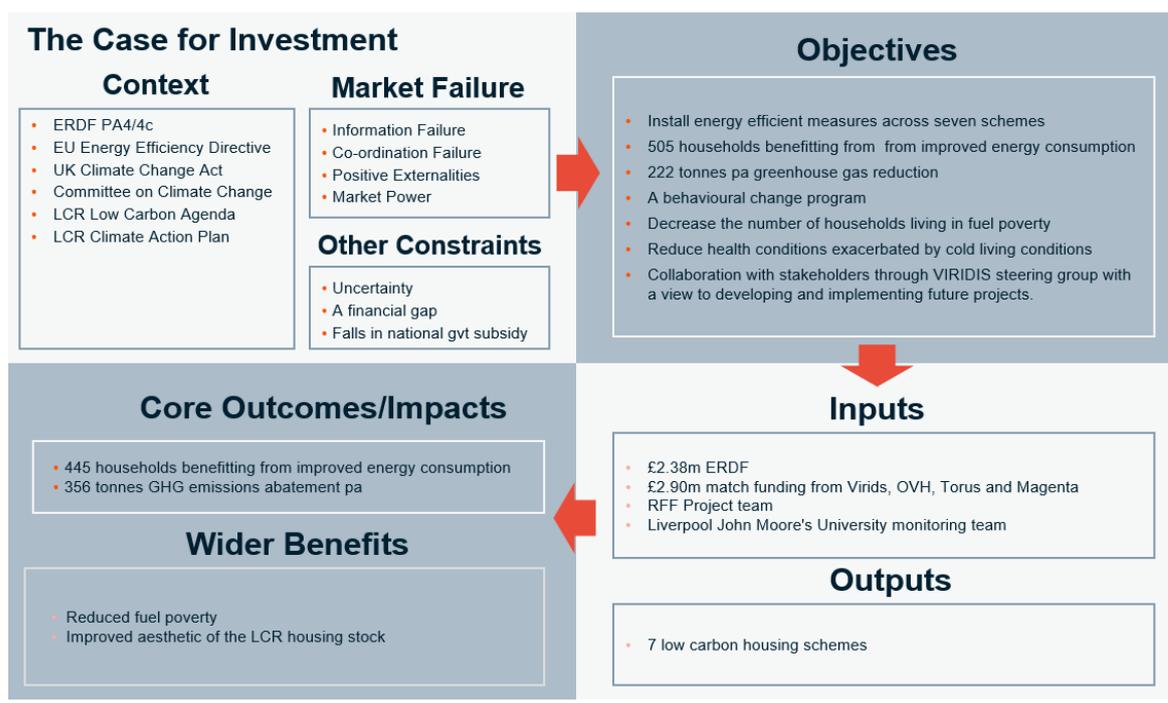
2. Project Context and Relevance

- 2.1 This section considers the economic and policy context in which the RFF project was designed and explores the nature of the market failure it was seeking to address, the project logic model and includes critical analysis about the appropriateness of the project's design given its objectives. The analysis in this section has been informed by:
- A review of background documentation for the project, including the project's original application form and other internal project management and delivery documents,
 - Consultations with the project management and delivery team (a full list of consultees is provided in Appendix B) and the project's MHCLG (now DLUHC) contract manager, and
 - A desk-based review of relevant policy documents and socioeconomic data.
- 2.2 This section draws on RFF's ESIF application and logic model, and as such, reflects first on the project's original expectations and vision. Since the funding agreement was signed and given the significant changes in circumstances due to factors such as the EU Exit and Covid-19 pandemic during the course of delivery, there have been inevitable changes in the way in which the project has been delivered in practice. The changes and the evolving rationale are explored further in sections 3-5.

Logic Model

- 2.3 This section explores:
- the areas of UK and LCR strategy that RFF is set to secure progress against,
 - the underpinning economic rationale and need for public investment in the project, and
 - the response to rationale and need delivered through RFF.
- 2.4 The core rationale is best summarised through a project logic model, shown in Figure 2.1. The model traces the programme's rationale to its intended outcomes in a step-by-step manner. This provides an overview of:
- the underpinning logic for public investment, including the strategic context, strategic and economic need and market failure rationale,
 - the response through RFF, and
 - programme inputs, outputs, outcomes and impact targets.

Figure 2.1 RFF Logic Model



Source: Hatch, 2023.

ERDF Priority Axis 4: Supporting the Shift Towards a Low Carbon Economy in All Sectors

2.5 RFF sought to address Priority Axis 4 and more specifically PA4c – ‘Supporting energy efficiency, smart energy management and renewable energy use in public infrastructure, including in public buildings and in the housing sector’. PA4 guidance³ highlights two key characteristics of funded activity that will need to be carefully considered in the Summative Assessment:

1) Innovation

2.6 The Operational Programme puts a strong emphasis on innovation and encourages ERDF to be used for innovation-based technologies and demonstrator activities. Standard retrofit activity (e.g. loft, cavity wall insulation, double/standard triple glazing, boilers, and solid wall insulation) is eligible but the use of innovative technologies or approaches are also required in conjunction with more standard approaches. Examples of innovation are cited in the guidance:

- retrofitting houses using a low carbon technology development partner, with a sample of houses testing near to market technology and monitoring and evaluation used to compare outcomes and impacts with a control group
- standard solid wall insulation applied through an innovative approach or as part of a whole place solution to support the installation of innovative low carbon solutions
- procurement to bring forward for trial more sustainable, carbon neutral and thinner insulation boards

³ assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832396/ESIF-GN-2-009_ERDF_Priority_Axis_4_Guidance_v5.pdf

- off-site construction of traditional ‘built on site’ solid wall insulation methods that are typically more expensive and take longer to deploy
- new ways to combine a range of existing measures.

2.7 There are a variety of proposed innovations associated with the seven RFF project. This phase of the Summative Assessment looks at the degree of innovation deployed across the seven projects, to ensure they aligned with ERDF guidance. As far as practical, this evaluation phase also gauges the benefit/impact of this innovation compared with standard approaches/technologies, by differentiating between the projects/measures deployed in the impact analysis and via consultation with delivery partners and stakeholders.

2) Behavioural change

2.8 Projects are encouraged to ensure energy awareness and behavioural change are integral to delivery, particularly for housing projects. The three RFF housing association partners were responsible for delivering or commissioning behavioural change programmes. This phase of the Summative Assessment explores the scale, type, effectiveness and impact of behavioural change activities that have been undertaken.

Wider Strategic Context

2.9 The RFF Logic Model presents the projects clear alignment to a range of European, UK and local climate change and energy policy and strategy, covering:

- **The 2012 EU Energy Efficiency Directive:** setting out national targets for each country to contribute to an overall EU target of 20% improvement in energy efficiency by 2020 and (as set out in a 2018 amendment) a 32.5% improvement by 2030⁴.
- **The UK Government GHG target:** committing the UK to binding agreements to reduce greenhouse gas emissions by 100% by 2050.
- **The Committee on Climate Change (2018):** suggests that meeting future carbon budgets and the UK’s 2050 target to reduce emissions by at least 80% of 1990 levels will require reducing domestic emissions by at least 3% per year. This will require existing progress to be supplemented by more challenging measures.
- **Liverpool City Region (LCR) Low Carbon Agenda:** pledging that the LCR will become zero carbon by 2040.
- **Liverpool City Region (LCR) Climate Action Plan:** commits to contributing to sustainable energy by investing £11.38m to retrofit approximately 1,120 homes across the LCR to high levels of energy efficiency.

The Market Failure Rationale

2.10 There are several core market failures affecting the market for innovative retrofit measures, which in the absence of public intervention, results in sub-optimal investment:

- **Positive externalities:** the project aims to reduce CO2 emissions, through enabling residents to reduce their energy usage. This is important in the wider drive to reduce global warming and improve air quality, something the wider LCR and us all will benefit

⁴ ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules/energy-efficiency-directive_en

from. Improved air quality and reduced emissions do not carry a market value and so are private. As a result, public funding is needed to bring these benefits about.

- **Information failure:** residents are often unaware of:
 - The benefits brought by investing in retrofit measures in terms of lower cost energy bills.
 - How best to use their utilities in order to improve their energy efficiency and to contribute towards the low carbon agenda.
 - Residents therefore typically underinvest in such measures and do not adjust their energy use behaviour according to what would be most beneficial economically. Public investment is required to educate residents in these benefits and to fund the measures that will enable residents to accrue financial benefits.
- **Split incentives:** there is evidence of underinvestment in energy efficiency measures on the part of landlords, where tenants pay energy bills (as opposed to being part of a single monthly payment to the landlord)⁵. In these cases, landlords have a reduced incentive to invest in measures they will receive little/no financial gain from (unless they are able to reflect energy efficiency in rental values).
- **Market power:** many social housing landlords provide the minimum specification in order to comply with regulations without implementing the need to address low carbon housing solutions and Government/ EU targets.
- **Economies of scale and co-ordination failure:** much of the retrofit activity being undertaken under the project (e.g., external wall insulation on large blocks of housing) requires a co-ordinated large-scale investment that would not be affordable for any one resident. A concerted public funding package is required to enable this major investment.

Wider Rationale/Need

2.11 As stated in the RFF ERDF Application:

“Approximately 80% of the UK’s current buildings will be in use post 2050 and currently produces 24% of CO2 emissions. [...] Approximately a third of all heat is lost in domestic properties is through the walls. A significant proportion of the LCR’s 670,000 properties have been constructed with solid walls (pre 1918 and system build processes), these are the least energy efficient properties and the hardest to ‘treat’ requiring specialist solutions”.

2.12 In addition to the market failures set out above, the following also act as a constraint on and requirement for investment in retrofit measures:

- **Uncertainty:** the RFF Logic Model submitted as part of the ERDF application also highlights uncertainty as a barrier to the development and deployment of residential retrofitting activity. Investment in any innovation has a long gestation period, with risks and uncertainties. Long and uncertain timescales for introducing new low carbon technologies mean that private actors are often reluctant to invest. This is not a market

⁵ E.g. Melvin, J. (2018) ‘The split incentives energy efficiency problem: Evidence of underinvestment by landlords’. Energy Policy 115.

failure per se, as the market is often reacting to the riskiness /uncertainty associated with new technologies in a rationale way.

As identified in the project ERDF application, there is also a lack of certainty around the legislative, regulatory and support mechanisms that encourage the investment in new technologies and services. This represents institutional failure, rather than market failure.

- **A financial gap:** finally, the financial costs and benefits (and uncertainty and timescale attached to those benefits) sometimes do not present residents/Housing Associations with a strong enough case to invest in retrofit energy efficiency measures. This includes providing lower cost finance, where funds are either non-repayable or subsidise the cost associated with searching for and servicing commercial loan finance. Public funding is required to close the financial gap, and make retrofit measures attractive financially.
- **A reduction in government subsidies in renewable technology (e.g. Feed in Tariffs):** meaning that public funding is required locally and that retrofit schemes incorporating renewable energy sources need to incorporate innovative solutions to meet low carbon targets. However, this is only relevant if an energy efficiency scheme incorporates a renewable energy source which has lost the feed-in tariff (e.g. solar).

Project Objectives

- 2.13 The projects core objectives aligned directly to those set out under the ERDF Operational Programme Priority Axis 4c: ‘Supporting energy efficiency, smart energy management and renewable energy use in public infrastructure, including in public buildings, and in the housing sector’.
- 2.14 Specifically, the project delivered against PA4.3: ‘Increasing energy efficiency in homes and public buildings, including through the implementation of low carbon technologies’.
- 2.15 The project objectives (set out in the Logic Model provided as part of the application for ERDF) were as follows:
- 1) A total number of 505 households will benefit from improved energy consumption.
 - 2) The estimated annual decrease of greenhouse gases will be approximately 222 tonnes of CO2 equivalent pa.
 - 3) Commission and install energy efficient measures across seven schemes throughout the LCR.
 - 4) Deliver a behavioural change program that will contribute towards a low carbon economy whilst raising awareness of best practice.
 - 5) Decrease the number of households living in fuel poverty.
 - 6) Provide healthy environments that reduce the effects of health conditions that are exacerbated by cold living conditions.
 - 7) Continue to work in collaboration with all stakeholders through the VIRIDIS steering group with a view to developing and implementing future projects.
- 2.16 **Two** of these objectives are in effect **outcome measures**:

- 1) 505 households benefitting from improved energy consumption
- 2) Greenhouse gas abatement of 222 tonnes per annum, and

2.17 The objectives are sensible and are SMART (Specific, Measurable, Achievable, and Time-bound).

Inputs & Activities

2.18 The ERDF outputs that were delivered against are:

- C31: households with improved energy consumption classification
- C34 estimated GHG reductions.

2.19 Although not an ERDF output and a specific target set for this project, the energy efficiency measures will also reduce annual household energy use.

2.20 The Logic Model completed for the ERDF application identified a number of activities under five areas of focus:

- **Compliance:** EU agendas, EU regulations, LCR targets, GFA requirements,
- **Implementation:** Deliver 7 low carbon housing schemes,
- **Education:** Deliver behavioural change to tenants and stakeholders,
- **Monitoring:** Provide innovative monitoring to capture both direct and soft outputs, and
- **Legacy:** The VIRIDIS steering group will support future low carbon initiatives.

Outcomes and Impacts

2.21 The core impacts generated by the project are expressed in terms of improved energy efficiency, reduced energy usage and reduced greenhouse gas emissions (aligning to objectives 1 and 2 under para. 2.15).

2.22 This Phase 2 report also explores the effect of the project, in qualitative terms, of:

- 1) fuel poverty alleviation
- 2) increased resident comfort and well-being (including potential reductions in health conditions exacerbated by cold living conditions)
- 3) improvements in the aesthetic of the affected housing stock.

The Theory of Change

2.23 The UK Government Magenta Book describes Theory of Change (ToC) evaluation as:

“a systematic and cumulative study of the links between activities, outcomes, and context of a policy intervention. It involves the specification of an explicit theory of “how” and “why” a policy might cause an effect which is used to guide the evaluation.”

2.24 The process of developing a ToC helps to ensure that both the client and delivery agents have a shared understanding of the project and its operational and strategic context. This better enables the evaluator to ask ‘intelligent’ questions and can be invaluable in illuminating key priority lines of enquiry for investigation during an evaluation. For example, whilst a research question may focus on whether a scheme works, the use of a ToC better helps evaluators to

consider whether it is likely to work differently, for different groups, under different circumstances. It also emphasises the importance of understanding how factors external to the scheme might influence its impact.

2.25 The ToC helps to show how the specific resources and services provided by RFF address specific challenges, lead to specific changes at household level and deliver technological progress and economic value. It establishes the approach and key lines of enquiry for the summative assessment.

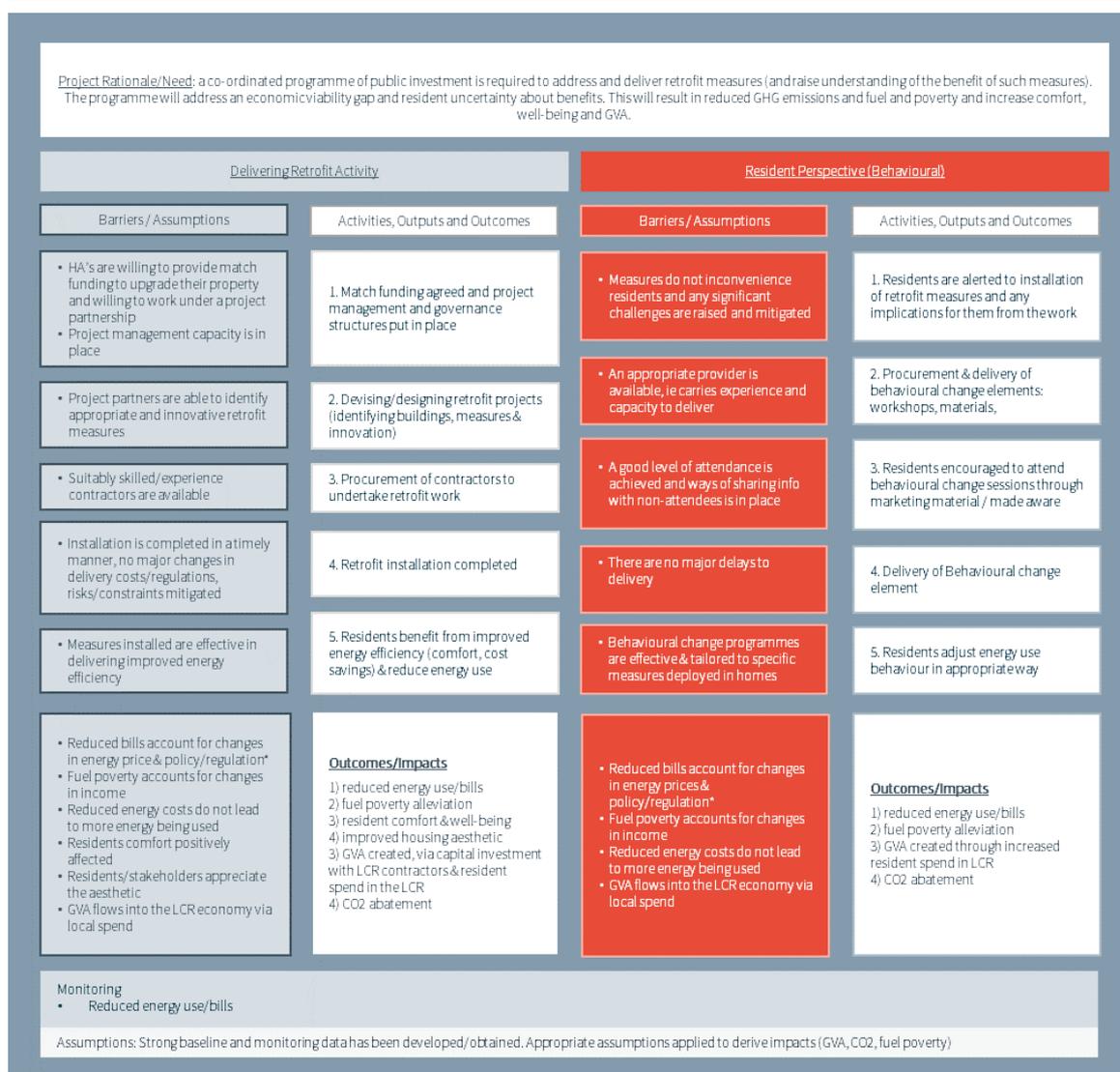
2.26 The ToC shown below is split into two strands:

- **The Delivery Perspective:** exploring how RFF responds to specific delivery challenges, from the formulation of the project, coming together of delivery partners and initial project design, the procurement of contractors, installation and effectiveness of retrofit measures.
- **The Resident Perspective:** exploring how RFF energy efficiency and supporting activities drive changes in behaviour and energy use among residents and CO2 abatement.

2.27 There are a number of factors outlined in the ERDF application Logic Model under 'Rationale' that form the basis for some of the factors that needed to be delivered to ensure that the projects objectives were met:

- Encourage delivery partners to embrace new innovative building solutions and technological advancements to achieve the desired outputs
- Promote and demonstrate the advantages of low carbon solutions in terms of cost savings, efficiencies and compliance
- Capitalise on the wealth of expertise in participating Higher Education Institutes (HEI's) by providing innovative monitoring programmes
- Forge relationships between the public and private sector in providing innovative housing solutions and improved efficiency and living conditions.

Figure 2.2 RFF Theory of Change



Source: Hatch, 2022.

Appropriateness of the Project Design

- 2.28 When considering the need of the project and the market failures RFF seeks to address, the evidence demonstrates a sound project rationale. The project design included achievable output targets and an appropriate financial profile for the works, however the project timescales may have not fully accounted for potential delays that can occur in capital projects/retrofit projects for residential schemes.
- 2.29 Elements of risk regarding engagement from tenants, potential issues with the buildings, weather-dependent installation of retrofit measures should be considered within the project timescales and assessment of risks.
- 2.30 The project has been well designed to contribute towards the ERDF horizontal principles of sustainable development, equal opportunities and non-discrimination. This is outlined further in Section 5 of this report.

3. Changes to Delivery Context

- 3.1 This section provides a brief analysis of any changes in the economic and policy context, which have been relevant to the RFF project, impacted on the original rationale or caused the shape of operational delivery to change.

Key Contextual Changes

Key Strategic Contextual Factors

- 3.2 Since project inception, there have been developments in the national and local policy environment, centred around the commitment to becoming net zero by 2050, which has reinforced the relevance of the RFF project:

National Level

- 3.3 There is a drive within UK government to improve on energy efficiency. Specifically, the government has sought to cut energy bills, reduce carbon emissions and energy consumption. A summary of some of the key relevant national policy documents that have been published since the project's inception are outlined below:

- **British Energy Security Strategy (2022)** – Identifies the transition to net zero and achieving energy efficiency as priorities for Government. The UK Government notes that by improving the efficiency of homes, heating bills could be reduced by around 20% and the UK could reduce dependency on foreign gas. By 2025, around 700,000 homes will be upgraded and by 2050, all buildings will be energy efficient with low carbon heating. The strategy notes that many measures can be utilised for reducing energy bills including cavity wall insulation, which will improve the efficiency of homes and on average, reduce bills by £300.
- **Build Back Better: Our Plan for Growth (2021)** - sets out ambitions to encourage long-term economic growth and generate high-quality jobs, through 'levelling up' of regions across the UK by building on three pillars: infrastructure, skills, and innovation. A policy response to the impacts of the COVID-19 pandemic, the strategy supports investment in net zero and carbon capture, as well as capitalising on clean energy technologies to facilitate growth. The plan notes that the government is expanding the 114,000 jobs already in the energy efficiency sector.
- **Net Zero Strategy: Build Back Greener (2021)** – outlines four key principles which will drive the long-term vision to reach net zero greenhouse gas emissions by 2050. These include Government support for energy efficiency upgrades and energy bill discounts, as well as deep cost reductions in low carbon technology to deliver benefits for businesses and consumers. The strategy noted there is a need for the UK workforce to have the skills needed to meet increasing demand in areas such as housing retrofit. The building services engineering for construction T Level, launched in September 2021, covers housing retrofit and heat pump installation. Within the strategy document the Government commits to providing £800 million additional funding to the Social Housing Decarbonisation Fund (SHDF) over 2022/23 to 2024/25, which will deliver energy performance improvements to social housing. In addition, the Government will consider setting a long-term regulatory standard to improve social housing to EPC band C. The

Government recognises that Local Authorities have been, and will continue to be, key delivery partners when it comes to improving the housing and building stock across the country, especially through integrating activity on energy efficiency, heating and retrofit. 69 projects have been successful in bidding for Wave 1 funding for the Social Housing Decarbonisation Fund Wave 1, amounting to £179 million of funding⁶. Through the Wave 1, around 20,000 social housing properties currently below EPC C rating will be upgraded, helping to cut fuel bills for social housing tenants as well as delivering warm homes and reducing carbon emissions. The funding will also support around 9,000 jobs in the green energy sector and deliver carbon emissions savings equivalent to taking up to 6,000 cars off the road in any given year.

- **The Ten Point Plan for a Greener Industrial Revolution (2020)** – aspires for the UK to invest in clean technologies (including wind, carbon capture and hydrogen) to level up the country and lead a new green industrial revolution. ‘Point 7: Greener Buildings’ in particular, highlights the need to improve energy efficiency standards. The plan aims for 600,000 heat pump installations per year by 2028 and commits to extending the Green Homes Grant and commits further to the Social Housing Decarbonation fund. In 2021, as part of the ‘Green Industrial Revolution’ the UK government announced a £166 million cash injection for green technology⁷.
- **Energy White Paper: Powering our Net Zero Future (2020)** - supporting the Ten Point Plan and the National Infrastructure Strategy objectives to transform energy and provide opportunities to save on energy bills. The White Paper notes that upgrading all UK homes to EPC C could provide annual energy bill savings of £7.5 billion. In July 2020, the government announced £50 million for 2020/21 to kickstart delivery of this ambition, piloting innovative retrofit projects across the UK.

3.4 The UK government have identified specific funding to address fuel poverty and barriers to achieving energy efficiency improvements:

- **UK government’s plan to invest over £9 billion into eradicating fuel poverty** – As part of this plan the government announced in 2021 that over 50,000 households will get warmer, greener homes in £562 million boost⁸.
- **Whole House Retrofit competition** - A total of £7.7 million has been awarded to the first 3 winning organisations in the Whole House Retrofit competition. The 3 projects are seeking to achieve reductions in the cost of retrofitting of between 5-20% across a range of building types, with each retrofitted property delivering an energy performance of at most 30 kWh/m²/yr. A total of more than 300 houses will be retrofitted.

Local Level

3.5 The Liverpool City Region Combined Authority declared a Climate Emergency in May 2019 and established a Climate Change Select Committee to look at four key themes:

⁶ Department for Business, Energy & Industrial Strategy, 2022, [Social Housing Decarbonisation Fund Wave 1: successful bids - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/social-housing-decarbonisation-fund-wave-1-successful-bids)

⁷ Department for Business, Energy & Industrial Strategy, 2021, [£166 million cash injection for green technology and 60,000 UK jobs - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/166-million-cash-injection-for-green-technology-and-60000-jobs)

⁸ Department for Business, Energy & Industrial Strategy, 2021, [Over 50,000 households to get warmer, greener homes in £562 million boost - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/news/562-million-boost-to-warm-greener-homes)

- Transport and Air Quality
- Buildings and the Built Environment
- Waste, Recycling and Energy
- Low Carbon Economy.

- 3.6 The LCR CA published its **Year One Climate Action Plan** for 2020/21. The Year One Climate Action Plan was created to ensure ‘opportunities for early action are not missed’ as the city region strives to become zero-carbon by 2040. Environmental schemes are underway or planned as the city region seeks to Build Back Greener from the coronavirus pandemic. LCR set out that they will publish a **Net Zero Carbon 2040 Climate Strategy and Action Plan** during the timeframe of the Year One Climate Action Plan. In 2022 the **Liverpool City Region Pathway to Net Zero⁹** was published. The pathway document notes the LCR homes need to tackle the net zero challenge by improve the energy efficiency of homes, promoting behavioural change, insulating properties, stopping the use of fossil fuels, providing heat on a neighbourhood scale and making technology changes (which may be complex). The document notes that Liverpool City Region has secured nearly £40 million to retrofit more than 3,6000 of the least energy efficient homes across the city region by March 2023. However, the pathway document calculates that an overall investment of £12 billion is required to achieve net zero homes in LCR.
- 3.7 In the first initiative of its kind in England, Liverpool City Region is working with the Royal Town Planning Institute (RTPI) on a **Resilience Policy** for the city region’s 1.6 million residents. The policy is to be incorporated in the city region’s emerging Spatial Development Strategy (SDS), will have legal weight and will join up housing, transport, green space and other planning policies across the region to mitigate the effects of climate change.
- 3.8 Specifically looking at social housing, £11.1 million has been secured from the government’s national **Social Housing Decarbonisation Fund** to tackle fuel poverty and boost energy efficiency across Liverpool City Region’s social housing stock. The money will take the Combined Authority’s **total investment in measures to tackle fuel poverty and reduce emissions to £54.5 million**, which will mean energy efficiency measures can be fitted to the properties of 5171 low-income households¹⁰.

Key Socio-Economic Contextual Factors

- 3.9 Since RFF launched in 2019, there have been significant changes in the local and national political and economic landscape which may impact on the project’s delivery, impact and continued relevance. The table below reviews a range of these factors and assessed their potential impact on the project. It should be noted that some of these factors are explored in further detail within the delivery and management review within Section 6 of this report.

Factor	Changes	Impacts on Project
EU Exit	<ul style="list-style-type: none"> • The UK and EU agreed on a post-Brexit trade deal, which came into force in January 2021. The new deal resulted in 	<ul style="list-style-type: none"> • The UK’s exit from the EU has caused some supply chain delays for the project. The delays with

⁹ LCRC, 2022, Liverpool City Region Pathway to Net Zero, [LCR-PathwaytoNetZero-Report-2022--FINAL-compressed.pdf](https://liverpoolcityregion-ca.gov.uk/LCR-PathwaytoNetZero-Report-2022--FINAL-compressed.pdf) (liverpoolcityregion-ca.gov.uk)

¹⁰ LCRC, 2022, [£11.1 million boost to tackle fuel poverty and boost energy efficiency in the Liverpool City Region’s social housing](https://liverpoolcityregion-ca.gov.uk/news/11-1-million-boost-to-tackle-fuel-poverty-and-boost-energy-efficiency-in-the-liverpool-city-region-s-social-housing/) | Liverpool City Region Combined Authority - News (liverpoolcityregion-ca.gov.uk)

Factor	Changes	Impacts on Project
	<p>uncertainty for businesses, in relation to trade, employee and other regulatory considerations and has caused disruption to supply chains.</p>	<p>the supply chain compounded by Covid-19 delays meant that contractors were not willing to enter into time limited contracts.</p>
Covid-19	<ul style="list-style-type: none"> • During the pandemic outbreak in the UK in March 2020, Government enacted several measures, which restricted economic and social activity, to curb the spread of the coronavirus. • Following the first national Covid-19 lockdown which saw restrictions ease on 23rd June 2020, second (5th November) and third lockdowns (4th January 2021) followed either side of Christmas 2020. Liverpool City Region was also moved to Tier 3 on 14th October 2020, ahead of the second national lockdown, following a rise in coronavirus infections. This meant Liverpool spent almost 17 weeks in national or local lockdowns. 	<ul style="list-style-type: none"> • Covid-19 has caused significant delays in the delivery of the project due to: restricted operations of delivery partners to essential works for an extensive period, residents being reluctant to allow access to properties due to risk of Covid-19, social distancing and other restrictive measures in place on site, staff absences due to Covid-19. • Engagement with the Managing Authority regarding the pandemic was undertaken in March 2020 at the earliest opportunity and the project management team attempted to mitigate the risks as soon as possible.
Net Zero Target	<ul style="list-style-type: none"> • In June 2019, the UK Parliament implemented legislation requiring the Government to reduce the UK's net emissions of greenhouse gases by 100% (relative to 1990 levels) by 2050. • In response to the UK target, the LCR CA have set out a commitment to reach net zero by 2040. 	<ul style="list-style-type: none"> • The introduction of the UK and LCR CA's net zero targets demonstrate that retrofit projects such as RFF have become increasingly relevant in recent years to support this ambition, through increasing energy efficiency, reducing the GHG emissions of the stock and promoting behavioural change.
COP26	<ul style="list-style-type: none"> • In November 2021, the UK led an international plan 'the Breakthrough Agenda' to deliver accessible and affordable clean technologies globally by 2030. Businesses and governments have been encouraged to work together to accelerate innovation and scaleup green industries. 	<ul style="list-style-type: none"> • RFF remains important as it seeks to deliver innovation and can be built upon by future schemes. COP26 has had no direct impact on the project however it may contribute towards increasing importance placed on innovation.
Energy Crisis and Fuel Poverty	<ul style="list-style-type: none"> • There has been a global surge in gas demand due to lifting of Covid-19 restrictions and economies reopening, which has increased wholesale gas prices for the UK and overseas. In tandem, the UK has a gas shortage which together has created uncertainty in the UK energy market 	<ul style="list-style-type: none"> • RFF seeks to tackle fuel poverty of residents who have received the RFF measures. Many of the resident's struggle with fuel poverty. The energy crisis has placed increased relevance on the need to tackle fuel poverty. Although the energy crisis has not directly impacted the delivery of the project it has

Factor	Changes	Impacts on Project
	<p>and is expected to result in increased energy costs of 54%¹¹.</p> <ul style="list-style-type: none"> (In 2021) BEIS reported that in 2019 13.4% households (3.18 million) lived in fuel poverty in England, down from 15.0% in 2018¹². However it is argued that the Energy Crisis¹³ and economic impacts of Covid-19¹⁴ have pushed fuel poverty levels up since 2019. It should be noted that social housing residents are more vulnerable to fuel poverty than homeowners, as residents are often older and living on lower incomes. The BEIS report notes that median income of households living in social housing was 17.1% lower than for private rented households, but higher levels of energy efficiency have driven down the rate of fuel poverty from 40.3 per cent in 2010 to 18.4 per cent in 2019. 	<p>highlighted the importance of addressing fuel poverty and the benefits that can be achieved by implementing projects such as RFF.</p>
Retrofit Activity	<ul style="list-style-type: none"> Larger scale funding through the Green Homes Grant, Social Housing Decarbonisation scheme, and recent announcements of funding in LCR CA became available 	<ul style="list-style-type: none"> This has not directly impacted RFF however the project may be able to provide lessons and best practice to other similar projects both in LCR and the rest of the UK. Further funding stream represent opportunities to build on the benefits RFF has delivered. The increased level of funding demonstrates that retrofit activity has become a national priority

3.10 Overall, the changing policy and socioeconomic context suggests that RFF is even more relevant than when originally designed. The project aligns with the aims and commitments outlined in several policy documents since the project launched and the emphasis on the need for retrofit activity and future investment in similar schemes has become a national priority whilst the scheme has been delivered.

¹¹ [British households face record 54% energy bill rise as price cap is raised | Energy bills | The Guardian](#)

¹² [Annual Fuel Poverty Statistics LILEE Report 2021 \(2019 data\) \(publishing.service.gov.uk\)](#)

¹³ [6m UK homes may be unable to pay energy bills after price hike, charity warns | Fuel poverty | The Guardian](#)

¹⁴ [Fuel Poverty - House of Commons Library \(parliament.uk\)](#)

Project Change Requests

3.11 Since RFF's inception, SMBC have submitted three project change requests (PCR),

PCR 1

3.12 A **Project Change Request** (PCR) was submitted to MHCLG and agreed in September 2019, partly as a result of delays in the project progressing but also due to other changes required for some of the specific RFF schemes. The PCR contained the following changes:

- An increase in the CO2 equivalent target (231 to 285 tonnes) following final EPC estimates.
- An extension to the project end date, to 31st December 2020 due to the delays. The project management team will remain in post until 28th February to process final claims, and oversee the final audit & completion of the summative assessment.
- The addition of Liverpool John Moore's University (LJMU) as a delivery partner, providing innovative monitoring for the OVH Oxford House scheme. The findings of the LJMU project, are included in this report.
- Reprofitting of fees for the construction of the Torus 62 and Magenta schemes .
- A reduction in the total number of properties benefitting from the project, from 506 to 502.
- Reprofitting project expenditure to increase the hours of the Project Manager (Laura Riley) from part-time to full-time hours on the project from 1st November 2019.
- A contractual name change for Liverpool Mutual Homes to Torus 62.

PCR 2

3.13 A second PCR was submitted in November 2020, which requested a change in the timeline of project delivery and a financial reprofiling of the project. More detail about the PCR is shown in Table 3.2 below.

3.14 This PCR was submitted due to the implications of the Covid-19 pandemic on the delivery of the project. These included:

- delays to procurements being agreed,
- contractors withdrawn from sites following Government guidance,
- introduction of socially distanced working arrangements, and
- additional revenue and capital costs.

Table 3.2 PCR 2 Changes

Changes to key dates	Key Date	Initial date	New date
	Activity End Date	31/12/20	31/10/21
	Financial Completion Date	28/02/21	30/11/21
	Practical Completion Date	28/02/21	30/11/21

Changes to project funding	There was a proposed reduction to both ERDF and public match funding due to procurements for OVH and Magenta being awarded under the forecasted budget. During the construction phase there were no additional costs and all unforeseen expenditure incurred as a result of the Covid-19 pandemic was covered by the Delivery Partners. Both the ERDF and public match revenue budgets significantly increased as a result of the proposed project extension caused by the Covid-19 pandemic. The additional expenditure was required to cover the Grant Recipient project management team salaries following a request from Torus to extend the delivery of two of their main Retrofit schemes. In order to sustain the revenue budget without the requirement of additional funding from ERDF, budgets were reprofiled. This included a reduction of the marketing and consultancy budgets together with a small transfer from the capital budget in order to increase revenue cap.
Changes to expenditure profiles	The total project budget has decreased from £5,001,933 to £4,997,715. There were reductions in the capital budget expenditure for both building and construction and professional fees both related to procurements being awarded under the forecasted budget. The increase to the salaries and FRIC was due to the proposed extension from February 2021 to November 2021. The marketing budget reduced as a result of savings made in procurements and the reduction of marketing events due to the Covid-19 pandemic. In order to fund the increase in revenue costs, SMBC proposed to reduce to post Retrofit EPC assessments to a 50% sample in order to make an approximate £13,000 saving.
Changes to output profile	The assessments to confirm the energy efficiency improvements and carbon savings are proposed to be completed at the end of the project.

Source: SMBC, 2020, Project Change Request Application and Assessment Form.

PCR 3

- 3.15 A third PCR was submitted in October 2021. This PCR requested a change in the timeline of project delivery and a financial reprofiling of the project. More detail about the PCR is shown in Table 3.3 below.
- 3.16 This PCR was submitted due to further Government imposed restrictions and associated issues with completing the works for Torus properties. The PCR requested a further extension to complete all outstanding Torus properties. While aiming to complete works as quickly as possible, completing external wall insulation works during winter months brought about further risk. Therefore Torus proposed:
- Targeting completion of 111 properties by 31st December 2021 and guaranteeing completion of 90 properties.
 - In the event of poor weather, completing remaining 21 properties by 31st January 2022.

Table 3.3 PCR 3 Changes

Changes to key dates	Key Date	Initial date	New date
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	Activity End Date	31/10/21	31/12/21 (extending to 31 st January 2022 in the event of poor weather)
	Financial Completion Date	31/03/22	31/03/22
	Practical Completion Date	31/03/22	31/03/22
Changes to project funding	<p>As capital costs were projected to be £4,511,041 in PCR 2 and 3, the proposed capital funding profile reduced from £4,737,500 in PCR 2 to £4,511,041 in PCR 3. ERDF and public capital match funding fell by 2.5% and 6.6% respectively.</p> <p>However, as the expenditure profile was updated to reflect recent claims, include defrayal in the final quarter and include the summative assessment/verification of outputs, revenue funding increased from £453,424 to £490,892. Both ERDF and public organisations increased their funds by ~8%.</p> <p>As the decrease in capital funding outweighed the increase in revenue funding required, the total project value fell from £5,190,924 to £5,001,933.</p>		
Changes to expenditure profiles	<p>The expenditure profile was updated to reflect recent claims and to include defrayal in the final quarter for the remaining scheme and the summative assessment/verification of outputs. As such, revenue costs increased from £4,997,715 to £5,001,933 via increased expenditure on salaries, flat rate indirect costs, professional fees, and consultancy fees. The capital expenditure profile did not change.</p>		
Changes to outputs profile	<p>No changes to the output targets were made, all outputs are proposed to be achieved by Q4 2022.</p>		

Source: SMBC, 2021, PCR Application and Assessment Form.

3.17 The contracted output target up to Q1 2022 was:

- 505 C31 households with improved energy consumption classification
- 222 tCO₂e GHG reductions

PCR 4 - Change Request for Phase 2 of RFF

3.18 The RFF project was granted an extension in May 2022 to deliver an additional programme to be called Phase 2 RFF. The project would cost around £9m and was due to be complete in July 2023. The project built on the back of the Phase 1 programme. In a similar set up to Phase 1 of the programme. Phase 2 was proposed to be made up of a consortium of registered providers, Liverpool City Region Combined Authority and Sefton Council.

3.19 The Phase 2 RFF programme was to deliver works to 519 properties and save 405tCO₂. The details of the Phase 2 scheme are set out below.

Table 3.4 PCR 4 Changes			
Registered Provider	Estimated Contract Value (capital)	Number of Units	Measures
Prima	£1,179,750	33	EWI, under floor insulation, photovoltaic technology, windows and doors, smart heating controls and lighting.
Onward Housing - Bosco	£217,833	33	Air source heat pump Installation, roof mounted photovoltaic array and battery storage (circa 50kWp system), electric vehicle charging points.
Onward Housing - Florence	£300,034	33	Air source heat pump Installation, roof mounted photovoltaic array and battery storage (circa 50kWp system), electric vehicle charging points.
Onward Housing - Meadow	£112,500	68	Roof mounted photovoltaic array and battery storage circa 70kWp system
Onward Housing - EWI	£4,250,000	250	EWI
Torus - Kirk Street	£1,104,689	42	EWI, ventilation, windows, and loft insulation
Torus - Lacey Street	£273,671	9	EWI ventilation, insulated flat roof
Torus - Massey Street	£380,546	17	EWI, ventilation
Torus - Millom Grove Flats	£579,246	26	EWI ventilation, loft insulation
Your Housing - Home Baked	£581,269	8	Whole house retrofit

Source: SMBC, 2022, PCR Application and Assessment ESIF-Form-3-022.

- 3.20 In March 2023 SMBC formally notified DLUHC that Phase 2 of the RFF programme would be closing early, with the last and final claim in Q1 2023 (Claim 19). The claim would cover SMBC's staff and legal cost associated with setting up Phase 2. No capital was claimed as no works were carried out on Phase 2.
- 3.21 This decision was made following withdrawal of delivery partners and the risk of clawback on the programme. The risks were the timescale, procurement, and audit risk.
- 3.22 Alternative funding streams, such as the Social Housing Decarbonisation Fund, have been found for the Phase 2 projects so that residents do not miss out on valuable retrofit works.

4. Best Practice Review Summary

- 4.1 The evaluation is supported by a review of best practice guidance and learning from other Retrofit programmes, examples of programmes delivered in the UK and internationally, and the wider literature and evidence on what works well.
- 4.2 This best practice review aims to explore examples of best practice and the lessons learned in terms of the delivery structure, co-ordination between partners, monitoring, the technology and solutions deployed, methods of installation and means of maximizing resident behavior change and impact. The review considers general best practice guidance from Innovate UK and Carbon Co-op. It then considers examples of best practice and lessons learnt from the predecessor project to RFF, REECH and other retrofit projects, innovative approaches and areas that are related to best practice in retrofitting. Overall, the review presents over 10 different retrofit projects from around the UK that have elements of best practice or key lessons learnt relevant to the RFF project. A detailed best practice review is presented in Appendix A - this section of the reports summarises the key findings from this review and how this relates to RFF.
- 4.3 The LCR RFF scheme reflects many of the areas of best practice found elsewhere including:
- **Targeting those most in need of intervention:** when selecting which properties received the RFF measures the delivery partners considered the energy efficiency performance (using SAP) of their housing stock and focused the RFF intervention on properties which had lower energy performances and where significant gains could be made.
 - **Strong management and governance of the scheme:** many of the housing associations commented on the strong management and governance of the scheme. Delivery partner meetings took place regularly to discuss any issues and SMBC provided guidance where required. The project also faced significant challenges (especially Covid-19) which were navigated effectively in terms of management and governance.
 - **Keeping residents informed:** the housing associations were in touch with residents, especially during the pandemic to inform them of the situation.
 - **Educating residents:** it is important that residents know how to use their updated technology in order to optimize their outcomes. The RFF project includes a behavioral change element, which include providing residents with information and advise on how to optimise the use of the new technology.
- 4.4 The best practice review also highlighted a number of best practice approaches that could be incorporated into future projects of a similar nature:
- A whole house scheme, drawing inspiration from the Energiesprong approach would achieve greater carbon emissions reductions.
 - Greater implementation of monitoring sensors would be beneficial to future projects as the use of innovative monitoring was limited on the RFF project to one high rise building and only a small number of flats within this building.
 - Although this scheme targeted those in need, similar future schemes may wish to also incorporate people in need who are living in private accommodation. It should be noted that the OVH scheme did not discriminate between OVH residents and lease hold tenants.
 - Reduce disturbance to residents further by utilising offsite manufacturing when relevant; the monitoring sensors used in RFF provided no significant disturbance to residents and could be implemented to monitor future retrofit schemes.

5. Progress against Contractual Targets

- 5.1 This section provides an overview of the project's progress in terms of the contractual ERDF output targets and financial profile, and the extent to which it has supported the horizontal principles. It includes a discussion of the reasons for under or over performance and considers whether targets were considered realistic or stretching from the outset.

Financial Performance

- 5.2 The total project budget for RFF was reduced from £5,001,933 to £4,997,715 (a reduction of c.£4k) as part of the project's second Project Change Request (PCR), submitted in November 2020 (further details outlined in Table 3.2). A summary of the changes to the budget are presented in Table 5.1 below.
- 5.3 Due to staff changes for both the Grant Recipient and Delivery Partners, the project was delayed in getting started. A PCR was agreed by the Managing Authority to extend the RFF until February 2021. A further PCR was submitted in November 2020 due to the impact of the Covid-19 pandemic on the project. Within this PCR all finances and outputs were reprofiled with no requirement for additional ERDF funding.

	Original	PCR 2	Variance
ERDF (Capital)	£2,030,161	£2,028,067	£2,094
Public Match (Capital)	£2,480,880	£2,482,974	-£2,094
Total Capital	£4,511,041	£4,511,041	£-
ERDF (Revenue)	£220,922	£218,798	£2,124
Public Match (Revenue)	£269,970	£267,876	£2,094
Total Revenue	£490,892	£486,674	£4,218
Total ERDF	£2,251,083	£2,246,865	£4,218
Total Match	£2,750,850	£2,750,850	£-
Total Project Value	£5,001,933	£4,997,715	£4,218

Source: Sefton PCR 211021 ESIF-Form-3-037 Annex A Financial and Output Information v2

- 5.4 As of January 2023, the project had claimed £4.49 million, 90% of the total project budget. The capital-revenue split is summarised in Table 5.2 below.
- 5.5 There has been a slight underspend due to the innovative underfloor heating scheme and the external wall insulation scheme not fully achieving their targets (due to Covid-19 related access issues and issues with moisture preventing installation for the external wall insulations scheme, outlined further in Section 6 of this report), but the final expenditure fell comfortably within the 15% permitted threshold.

	Total Claimed end of 2022 (£000s)	Overall Budget (£000s)	Proportion of end of 2022
Total CAP	£4.133	£4,511	92%
Total REV	£357	£487	73%
Total	£4,490	£4,998	90%

Source: RFF Claim 14 Project Progress Report

- 5.6 Within the original Grant Funding Agreement, all expenditure was expected to be completed at an earlier date. However, following the financial reprofile within a third PCR which was submitted on 21st October 2021, both the capital and revenue budgets were extended until March 2022.

Output Performance

- 5.7 Table 5.3 below summarises the financial and output performance of the project using the standard summative assessment format.

Indicator	Targets		Performance	
	Original	Adjusted	No.	% target
C31: Number of households with improved energy consumption classification	506	505	445	88%
C34: Estimated annual decrease of GHG (tonnes)	231	222	356	161%

Note: Performance covers the period from start of project up to Q1 2022 (when all properties were complete).

- 5.8 EPC assessors have assessed the energy performance of the properties. The results have been collated and verified and claimed as part of the final quarterly monitoring report (as agreed with MHCLG/DLUHC). The data from the analysis of energy efficiency and carbon savings suggest they have exceeded targets for estimated annual decrease of GHG. This data has been verified by energy consultants and it is based on relatively a high sample of SAP ratings for properties and is set out in more detail in Section 8. Covid-19 restrictions were a major factor in not fully delivering to the target.

Horizontal Principles

- 5.9 The Horizontal Principles are grouped under two cross cutting themes:
- Sustainable development
 - Equal opportunities and non-discrimination.
- 5.10 These cross cutting themes should be considered across all stages of a project from the design and development of projects to delivery and beyond.
- 5.11 RFF has contributed to the sustainable development theme through:
- Its procurement of buildings, goods, works and services through which Viridis has determined that a corporate and systematic approach can help achieve these aims. Each delivery partner also has sustainability indicators that it has to meet and is well versed in delivering sustainable development outcomes.
 - Deliver positive environmental impacts through project delivery supporting an increase in the number of energy efficient homes, increase awareness of energy efficiency measures, associated behavioural change and reducing GHG emissions.
 - Sefton is continually seeking ways to minimise paper in the process of reporting and be resource efficient where possible.

- When procuring marketing materials, requesting that recycled materials from sustainable sources are used. Developing Retrofit branded reusable cups and travel mugs to encourage users to reduce their single use plastic consumption.

5.12 The project supports the equal opportunities and non-discrimination theme through:

- Ensuring the recruitment of all staff for the Grant Recipient is compliant with Sefton MBC's Equality and Diversity policies and procedures.
- Selecting properties for the project based on archetype relevance and thermal efficiency need rather than the gender, disability, race, belief, age or sexual orientation of the resident.
- Making sure that resident engagement and behavioural change activity is open to and accessible by all eligible residents irrespective of gender, disability, belief, race, age or sexual orientation.

5.13 The project's ESIF application form also indicated that the Registered Housing Providers are experienced in engaging with their communities, understand legislative requirements and work to organisational equality and diversity policies, procedures and standards. They use this knowledge and experience to ensure gender and disability needs and issues are addressed and that unlawful discrimination, harassment and victimisation does not occur. The Registered Housing Providers have a track record of close engagement with the residents and communities they serve. The ESIF application form states that specialist engagement staff will communicate using appropriate language and through a variety of methods (in person, telephone, letter, social media and online), formats (talks, group meetings, 1-2-1 meetings, leaflets, downloads) and respond to cultural and personal sensitivities e.g. arranging visits at particular times, sending female workers where required, or enabling residents to access translation services of those for the hearing or visually impaired.

6. Delivery and Management Performance

6.1 This section provides an analysis of how effectively the project has been implemented in practice, highlighting the factors that explain the project's development and performance. It synthesises findings from **Consultations with management and delivery staff**:

- Hatch undertook consultations from September 2021 to February 2022 with management and delivery staff working on the project (consultations lasted 45 minutes to 1.5 hours). This included:
 - Housing associations delivering RFF (Torus, OVH and Magenta);
 - LJMU;
 - MCHLG; and
 - SMBC.

6.2 The analysis presented here draws together the findings across this strand of primary research to provide an assessment of the project's delivery and management performance.

Management and Governance

Strong management and governance demonstrated

6.3 SMBC, as the accountable body for the project, played a central management role in the RFF project. The project experienced several delays and disruption caused by staff turnover initially. The RFF project manager that was appointed at the initiation of the project (November 2018) resigned in March 2019. During the project design phase there were a number of design specification issues as well as a general lack of interest in some of the original tenders. Therefore, pre-project approval, the project was scaled down from an £8m to a £5.28m budget. This resulted in:

- reductions in some Housing Association's mainstream budgets, due to essential fire precaution upgrades required on External Wall Insulation following the Grenfell disaster
- the withdrawal of a number of delivery partners and funding (Liverpool Housing Trust and E.ON).
- OVH reducing its RFF schemes from 3 to 1.

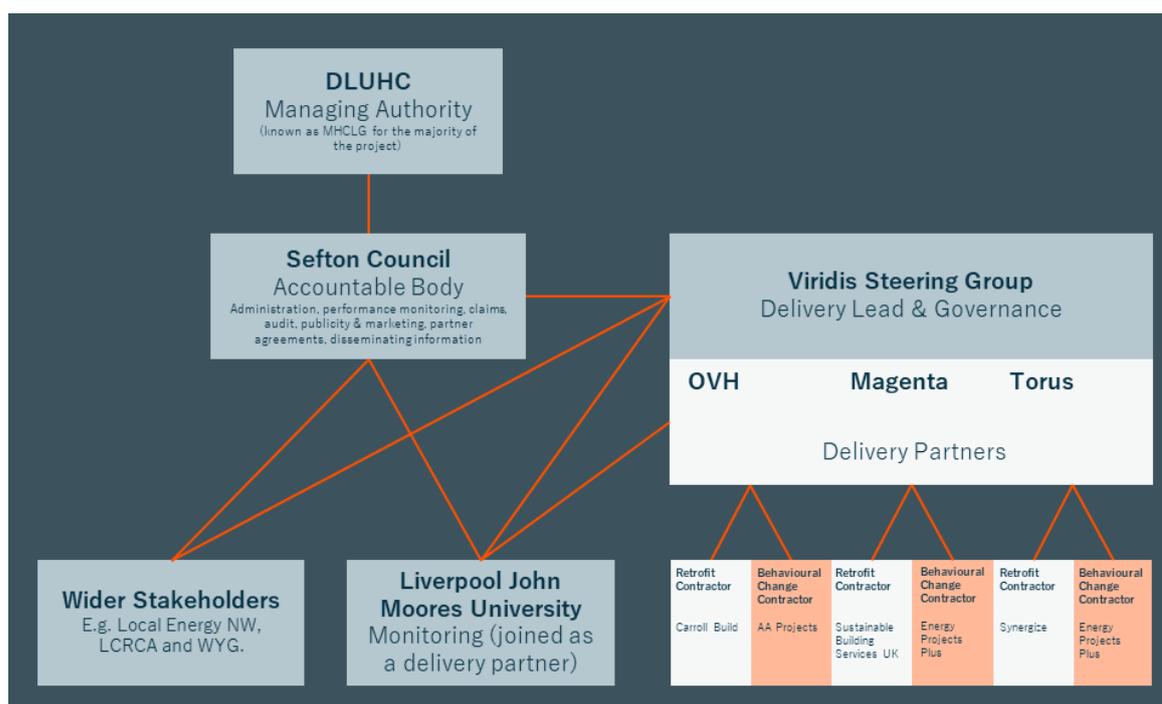
6.4 A new Project Officer (Laura Riley) was appointed in January 2019, and a new Project Manager (Neil Carroll) was appointed in May 2019. Whilst not being involved in the original design of the project, the new project management team were heavily involved in the redesign of schemes. The project manager and project officer are responsible for managing the delivery providers, monitoring project progress, compliance with ERDF funding requirements, audit as and when required, managing financial and output profiles throughout the project, marketing, promotion and data arrangements.

6.5 The RFF management team have worked well together to successfully mitigate against several issues that have arisen and delays and remain on track with the project, which demonstrates the effective management and governance of the project. During the initial meetings between the project team and MHCLG, it was apparent that the project was at risk of being withdrawn due to a number of factors including the withdrawal of several key delivery partners, management team vacancies and the lack of progress prior to the second application. The project management

team formed a strong working relationship with the Managing Authority and collaborative working arrangements with the Delivery Partners, which helped to instil confidence in the project.

- 6.6 SMBC have been supported by a Steering Group managed by Viridis, a sustainable building services company. The Steering Group comprised SMBC, the three housing association Delivery Partners, as well as Viridis as the Steering Group lead. The Steering Group is chaired by a member of staff from Torus (which used to be known as Liverpool Mutual Homes), while Sefton provides project management for the group. The Steering Group was responsible for overarching governance, awareness raising, publicity and dissemination activities. The delivery partners were required to:
- sign up to Delivery Partner Agreements, stipulating outputs, results and evidence criteria
 - implement of a performance management system and process which includes a suite of ERDF compliant documentation
 - provide quarterly monitoring and financial claims.
- 6.7 SMBC continues to work proactively with all Viridis members through a variety of working groups to promote future retrofit activity and reduce fuel poverty. It was noted by the RFF project management team that a number of other steering groups and workshop groups have been set up during the course of the delivery of the project, led by LCR Combined Authority, and that this has almost taken over the role of Viridis. However, the Viridis Steering Group, alongside the other working groups established, will still have a role going forwards in sharing best practice from the project.
- 6.8 Comments from consultations with the three housing association delivery partners were generally very positive in terms of Sefton’s management and governance of the project. Risks were effectively mitigated and managed, through regular meetings with delivery partners which provided a useful forum to discuss any issues that arose and find solutions at the earliest opportunity. These meetings involved all delivery partners and provided a good opportunity for sharing best practice, having open discussions and providing guidance on compliance with ERDF requirements. The delivery staff consulted all felt SMBC coordinated the project effectively and that the management structure was very useful in terms of them being able to run through the ERDF processes with the advantage of being able to ask questions and receive quick and accurate advice from project colleagues who are highly knowledgeable about the process.

Figure 6.1 RFF Management and Governance Structure



Source: Hatch, 2022. Note that no behaviour change were completed for the Torus schemes. There was funding set aside for this, but Torus never claimed this funding.

Factors Influencing Delivery Activities

RFF has faced several setbacks which have caused delays

6.9 In addition to the issues experienced early on in the project explored above and in the Phase 1 report, there have been several factors that have affected the RFF delivery activities:

- Brexit:** The UK's exit from the EU has caused some supply chain delays for the project. The project management team highlighted that the EU exit caused delays in acquiring materials necessary for some of the schemes and in some cases led to a shortage of materials. The delays with the supply chain compounded by Covid-19 delays meant that contractors were not willing to enter into time limited contracts.
- Covid-19:** In March 2020 the UK Government told the public they must stay at home as the UK went in to its first, and strictest, Covid-19 lockdown. Procurement was underway for a number of schemes at the time that the UK government measures came into place. Given that many of the schemes did not look likely to complete within the original timescales, the uncertainty relating to Covid-19 and the associated impacts on the economy, these schemes were at some risk of not being taken forward. The delivery providers had to pause works due to Covid-19 restrictions, in some cases this included pausing works that were partially complete. The delivery partners resumed works at various times, with some providers continuing with only reintroducing non-essential works for longer (which meant that they were not able to enter properties to undertake works until later on).

When the schemes resumed, the workforce had to follow new guidelines such as wearing masks and maintaining social distancing which limited the number of people able to

work on site. There were also delays caused by staff absences due to Covid-19 and self-isolation requirements. A number of residents, particularly more vulnerable residents, had concerns around Covid-19 and therefore refused access to their properties for work to reduce the risk of getting Covid-19. This caused delays to delivery of the project and in some instances, this wasted time one contractor was based in the North East of England and had travelled to install measures. Some of the schemes did not require access or required minimal access so could continue anyway. In some cases where residents did not want to proceed with works, additional properties were added to meet the overall property delivery requirement (eg for some of the neighborhood EWI schemes, potted properties were used which were easier to replace), but in some cases this contributed towards an underachievement against targets. The delivery partners tried to mitigate the impact by progressing with other parts when one section couldn't be completed to ensure progression didn't stall.

A PCR was submitted to MHCLG in November 2020 which sought to extend the project due to the impacts of the first Covid-19 lockdown. As the pandemic eased, contractors still encountered vulnerable residents who were not willing to provide suitable access but permitted staff levels on site have increased due to the lifting of Covid regulations. Contractor absences have reduced due to vaccination protection and tenant confidence is increasing.

- **Staff changes:** There were significant changes in key delivery staff over the course of the project with a number of project managers leaving their organisations during the project. For instance, the OVH project manager left the organisation in March 2020. To mitigate against the impacts of staff departures, RFF sought to recruit experienced staff to replace those that had left as quickly as possible or to expand the role of existing staff working on the project where more feasible. In the instance of OVH dealing with the loss of the project manager it was decided that the reinvestment delivery manager who had been involved in RFF from the design phase would be best placed to take over project management responsibilities as he was already familiar with the project. However the project manager's departure meant that there was an element of lost knowledge on the project which was identified as a challenge in the consultation undertaken with OVH staff, and Sefton noted that this had led to some issues with communication. Other staff changes which slowed delivery included:
 - The project manager appointed at the initiation of the project (November 2018) resigned in March 2019, a new Project Manager (Neil Carroll) was appointed in May 2019
 - A new Project Officer (Laura Riley) was appointed in January 2019
 - The MHCLG (now DLUHC) contract manager has changed three times, with the project currently not having a specific

- 6.10 There was no detailed hand over was provided to the new project manager and officer roles, this made familiarisation with the project more challenging. The project management team noted that occasionally, communication with Delivery Partners had been challenging due to staff turnover and the lack of handovers, however that they held a good relationship with all partners and in the majority of circumstances had been able to communicate effectively.
- 6.11 In addition to the delays caused by external factors, individual schemes were delayed for a number of other reasons:

- **Procurement challenges:** Several schemes faced issues in the procurement of contractors. For example, the preferred supplier for the Torus Portland Gardens scheme went into administration prior to their appointment. Administrative errors were made in the procurement for the Torus Elms House scheme. No interest from contractors was shown in the initial tender for works at the Torus Beechwood and Cherry Lane schemes. There were issues regarding fire safety certification during the procurement for the Magenta Bromborough scheme which were resolved.
- **Unexpected condition of properties:** During the winter, prior to treatment, moisture was located in dwellings within the Torus Innovative Underfloor Insulation scheme. This led to some delay in delivery. Also, asbestos was found in the window lining of the OVH Oxford House scheme, requiring additional works to be undertaken and a delay to the delivery timescale.
- **Party wall disputes:** These types of disputes are a potential issue in schemes which are treating just selected properties (eg the innovative underfloor heating scheme); therefore the management team and delivery partners have to be as open and transparent to neighbouring properties as possible. Contractors have also been encouraged to offer similar services to neighbouring properties if required.
- **LJMU joining the project as a delivery partner:** LJMU are leaders in the research and development of the kind of sensors that used to monitor energy use remotely and as they are local it was felt that they were the best placed organisation to provide this service as part of the RFF project. It was noted that the inclusion of LJMU as a delivery partner rather than having a service level agreement required various meetings with SMBC's legal services team to draw down the funding and was agreed through a formal PCR. The solution of including LJMU as a delivery partner avoided the need for LJMU to go through an open tendering process, which was deemed acceptable due to the reputation that LJMU has developed as an organisation that delivers social value and has a strong focus on innovation and R&D.

Administration, Monitoring and Claims Processes

Clear structure and division of responsibility made the administration, monitoring and claims processes run relatively smoothly

- 6.12 The reporting requirement were considered to be clear by the housing associations and there were no major issues experienced. SMBC used a centralised financial management system (Agresso) and ECLAIMS to submit ERDF claims, which has reportedly worked well. Claims are verified on a quarterly basis and certified through a finance officer at the Council. The project management team have kept all records in both digital and hard copy formats. The project management team indicated that they had not experienced any major issues with compliance.
- 6.13 The delivery partners were responsible for tendering for contractors, delivering the project and sending information to SMBC while Sefton was responsible for collating information to submit to MHCLG as necessary. SMBC was the central point in terms of ensuring projects ran correctly and when changes were required including extension to funding this was submitted by Sefton to MHCLG.
- 6.14 The structure of the Viridis steering group with the clear differentiation between roles and responsibilities is generally seen by the project group as an example of a best practice 5governance structure to take forward to other projects. It allowed the housing associations to

receive clear, structured guidance and for regular discussion and advice about any issues the project encountered. This has enabled the management team to deal with issues such as Covid-19 more effectively.

Communication and regular support have improved over time and helped with resolving issues

- 6.15 The MHCLG contract manager noted that there had been several issues with delivery partner engagement, which at one stage was escalated to Board level due to a lack of communication from one of the delivery partners. This improved after time but continued to be below the level that is expected of an ERDF programme of this scale (it should be noted that this is not due to any lack of attempts to engage from SMBC). SMBC highlighted that communication issues had arisen due to the high levels of staff turnover within the delivery partner organisations.
- 6.16 Housing association delivery staff found that they had regular support where needed, including advice from MHCLG and SMBC, as well as a regular monthly meeting forum to raise any issues in which the entire Viridis steering group were present so issues could be shared and resolved together. One housing association consulted noted that because the MHCLG contract manager joined the meeting, this meant delivery partners could receive guidance more effectively. Communication also took the form of site meetings, phone call and emails.

A more thorough assessment of risks at the planning stage would have been beneficial, and the lessons learnt about mitigating against potential risks should be considered within any future project

- 6.17 While the project management team have been efficient at addressing issues that have arisen, there could have been more focus within the project design on understanding potential risks that often arise in this type of project.
- 6.18 For example, one of the issues that arose was that asbestos was found in some of the properties, which delayed works. Whilst this specific issue might not have been expected, the project could have carried out a more detailed review at the design stage of issues that might arise with the buildings, potential unforeseen elements and how these could be mitigated, and allowed additional time within the project timescales to account for typical delays that arise with capital projects of this nature.
- 6.19 The innovative underfloor heating scheme did not fully achieve the desired outputs for a number of reasons, including moisture in the voids preventing works to be carried out, a lack of access partly due to the pandemic and inaccurate EPCs with misleading information regarding floor construction. The project could have undertaken pre-site surveys to assess the properties ahead of beginning the works to better mitigate against potential risks associated with targeting properties that are unsuitable for installation on the basis of inaccurate information within EPCs. The project timescales could have been better adapted to mitigate against the risk of high moisture levels preventing installation - for example, through considering this at the planning stage and ensuring that this element of the project is profiled for delivery during the dryer summer months.
- 6.20 The project's MHCLG contract manager noted that from the project could have also better anticipated the risks regarding engagement from tenants. Due to the number of cancellations within the scheme, using a local supply chain would also be more advantageous for future schemes in mitigating against the potential risks of this occurring.

Marketing and Engagement with Residents

A variety of marketing activities have been undertaken to engage residents and disseminate lessons learnt with local stakeholders and those designing similar policy initiatives

- 6.21 Marketing and promotion of the project was undertaken through a number of formats. A dedicated website was set up for the project which provided various information about the scheme including a project overview, procurement information and details about completions of measures. Press released were conducted through either SMBC or the delivery partners. Project management and delivery staff have also ensured a presence and in many cases had a stand at a range of local events to provide information about RFF to a range of stakeholders (such as local authority representatives, a local newspaper etc.). The project management team have also been key-note speakers for housing association retrofit events, where they have provided a project overview and discussed lessons learnt from the ERDF project, to feed into the design and development of subsequent projects of a similar nature. The North West Hub has also used the RFF project as one its examples of a successful delivery project in the recent COP26 events.
- 6.22 The project management team procured marketing materials to use for promoting the scheme to and engaging with residents. These have been disbursed to residents, various advocacy organisations and used in affordable warmth events by delivery partners and also housing associations who are not existing delivery partners.
- 6.23 Consultation with Housing Association project managers indicated that the delivery partners followed ERDF guidance within marketing and communication with residents. Periodic newsletters, signage on sites and regular communication (for example through meetings) with residents were employed to ensure the marketing and engagement met the requirements of the project. Specifically, where there was a particularly older demographic, the housing associations ensured there was regular communication. Covid-19 and lockdown meant there were challenges experienced in communication, however the housing associations kept residents well informed of delays.
- 6.24 Despite having a large marketing budget that was reduced due to Covid-19 (and not being able to carry out some of the in-person marketing activities planned), RFF has demonstrated good practice with getting the most value out of the remaining marketing budget through delivering as many marketing activities as possible virtually, with no/low cost.
- 6.25 RFF planed to hold a dissemination event following the completion of the project to provide a summary of the delivery, lessons learnt and impacts the project has had. The event is to be held virtually in June 2023 as part of LCRCA Retrofit Board with delivery partners and stakeholders attending the event.

Innovative Measures Implemented

Innovative measures used

- 6.26 One of the key changes from the previous REECH project, and a requirement under the ERDF PA4, was that innovation needs to be embedded within the solutions that are being deployed.
- 6.27 Some of the project delivery and management staff consulted highlighted there was lack of clarity on what would be defined as innovation within the context of this project and ERDF requirements. It was noted that there was not a written definition of what would be considered as innovative, however the MHCLG/DLUHC contract manager indicated that innovation did not

need to necessarily be within the materials used or method of installation, but could also be within any aspect of delivery, including services, the PM team etc.

- 6.28 The project was designed to explore a variety of innovative technologies such as external wall insulation, underfloor insulation and heating. Following the fire at Grenfell Tower (14th June 2017), there was unwillingness from contractors in the supply chain to install new, innovative cladding, systems due to a lack of specification from the government.
- 6.29 Although RFF included schemes that are deploying traditional External Wall Insulation (EWI), the traditional EWI projects could be seen as innovative due to:
- using local manufacturers to reduce the carbon footprint
 - using products that were new or close to market
 - part of a whole place solution (including other refurbishments funded outside of the ERDF project)
 - introducing LJMU as a delivery partner to provide innovative methods of monitoring (through use of digital sensors).
- 6.30 A number of the RFF schemes include innovative elements. The project included:
- the installation of innovative and near to market energy efficiency products
 - innovative solid wall and insulation systems
 - innovative heating solutions
 - off-site bespoke design and construction of innovative solid wall solutions, with installation on site
 - new techniques and installation methods, including the use of remotely controlled robots to install underfloor insulation
 - tailored whole place approaches, incorporating recognised solid wall insulations with a range of other measures.
- 6.31 Table 6.1 below states the details of innovation used across the RFF projects and the extent to which different projects were using innovations. This varied quite significantly across RFF with some projects using highly innovative solutions and others using more traditional technologies.

Table 6.1 Innovation across RFF projects

Project	Proposed number of Dwellings	Innovation used and extent to which this was innovative
Traditional EWI Oxford House Bootle, Sefton OVH	90 flats	<ul style="list-style-type: none"> • Liverpool John Moores University undertaking innovative monitoring of the internal environment and energy use in 6 to 12 dwellings throughout the delivery of RFF (including student placements/learning). • The monitoring uses tiny tag sensors and a weather station to provide live data, analysed by LJMU. • LJMU's monitoring technology is highly innovative as it is new technology developed by LJMU. • Combined ERDF funded RFF project with additional works to take a whole building approach. • There was a lack of innovation in the traditional External Wall Insulation as this technology that is now standard retrofit technology
Innovative Underfloor Insulation Torus Properties across Liverpool	94 dwellings	<ul style="list-style-type: none"> • New to market robotic solution being deployed to deliver underfloor insulation with minimal disruption. • The product is BBA certificated, and has been used elsewhere in the UK (primarily in the SE & London) • The technology is new to market so innovative as it seeks to solve the problem of disruption with a new solution.
Innovative Heating Portland Gardens Vauxhall Liverpool	36 sheltered flats for the elderly	<ul style="list-style-type: none"> • Installation of an innovative (water filled) electric heating system to replace inefficient traditional storage heaters • Residents are currently unable to control the existing system and temperature settings, meaning heating bills are often higher than needed. • Note: the scheme does not have a CO2 target and is focused primarily on fuel poverty reduction.
Traditional EWI Elms House Old Swan, Liverpool Torus	111 properties (multiple archetypes)	<ul style="list-style-type: none"> • No innovative measures
Traditional EWI	36 maisonettes	<ul style="list-style-type: none"> • No innovative measures

<p>Beechwood Gardens Cressington, Liverpool Torus</p>	<p>Cherry Lane 54 low rise Walton, Liverpool Torus</p>	<ul style="list-style-type: none"> • Formally innovative External Wall Insulation (EWI) used although reverted to traditional method • Initial plan was to install innovative Mauer EWI solutions, but Mauer did not bid for the contract. • It was agreed with MHCLG that the schemes can deploy traditional EWI despite there being a lack of innovation.
<p>Bromborough Wirral Magenta</p>	<p>84 properties (multiple archetypes)</p>	<ul style="list-style-type: none"> • Initially the plan was to install an innovative external walling system, which matches existing brick work – converted to traditional EWI after little/no interest was shown in the initial tender. • Magenta looked to confirm (with the MHCLG and through Viridis) if their measures can be considered innovative but have had difficulty in attaining a clear definition. • There are not many new products on the market, therefore this scheme fulfilled the innovative requirement through the way in which the work was delivered and set up, through using a company that both delivered and manufactured the work (ie not relying on supply chains). • No innovative technology although the approach was different from the norm and therefore could be seen as innovative, for the procurement is was agreed it was considered as innovative due to using one company to both manufacture the products and deliver the works, which meant there was a smaller supply chain and therefore less risk of being impacted by Covid-19.

Behavioural Change Activities

- 6.32 Past projects and research have demonstrated behavioural change is an important element of achieving successful outcomes when implementing energy efficiency measures. For example it is important that residents are informed on how to use any equipment effectively and the ways in which they can optimize energy efficiency such as reducing the amount of time windows are left open in their homes. Funding was set aside for each HA to provide residents with appropriate behavioural change activities.

Scope of Behavioural Change Activity proposed for OVH by AA Projects

- 6.33 AA Projects were commissioned by OVH to provide behavioral change management services. AA Projects has experience of providing consultancy advice across energy management and compliance, low or zero carbon feasibility, environmental assessment, planning and management and sustainability assessments.

Baseline:

- Report detailing the project, strategy, methodology, data analysis, benchmarking and anticipated outputs.
- Gathering of historic electricity and water bills and data for a selection of properties
- Surveying the same apartments to confirm specific areas heated, domestic appliances installed, lighting specification.
- Categorisation and profiling of apartments within Oxford House.
- In co-ordination with LJMU predict annual energy consumption to typical apartment types benchmarks for reductions and comparison post-works.

Pre-construction occupant behaviours:

- Development and circulation of a detailed energy questionnaire to understand current behaviours.
- Attendance at a pre-works Tenant Engagement Meeting prior to refurbishment works commencing.
- Analysis of questionnaire responses and presentation at a 2nd Tenant Engagement Meeting.
- Hosting of two Tenant Engagement Meetings during the refurbishment works
- In co-ordination with OVH, promotion of incentives for tenants to reduce their heating and hot water usage

Stage report:

- Production of a comprehensive report encompassing all elements included in the scope of works up to construction completion.

Post-refurbishment monitoring and occupant behaviours

- Arranging demonstration of new heating and MVHR systems in sample apartments post-works.
- Request recent electricity and water bills from apartments sampled in stage 1 for comparison against original data.

- Comparison of EPC data from the baseline to post completion EPC.
- Provision of a detailed Behavioural Change Management report / data analysis for whole tower block 12 months after refurbishment works for EDRF approval. Report to include all elements covered by scope of works.
- Arrangement of tenant engagement meeting 6 and 12 months following the refurbishment works.

6.34 The proposed total cost of all the elements of the programme outlined above was £14,355 excluding VAT.

Scope of Behavioural Change Activity proposed for Magenta by Energy Projects Plus

6.35 Energy Projects Plus were commissioned by Magenta to provide behavioral change management services. Energy Projects Plus provide advice, information, home visits, project management, training and awareness-raising to help tackle fuel poverty.

6.36 Energy Projects Plus proposed that all Magenta Living tenants benefitting from the ERDF RetroFIT for the FUTURE project to be provided with access to an in-depth energy consultation from an expert energy advisor at Energy Projects Plus. These consultations were to be delivered by phone, or via a video conferencing platform, and were to be tailored to the tenant's individual property, household composition and personal circumstances.

6.37 The advice and support proposed to be provided was to cover all aspects of energy efficiency, including:

- Effective use of heating controls within the context of new insulation.
- Review of fuel tariffs and advice on switching if appropriate.
- Advice on smart meters.
- Access for eligible tenants to Energy Project Plus's LEAP (Local Energy Advice Partnership) project, that can install 'easy measures' such as LED bulbs, radiator reflector panels and standby savers, to further enable energy cost reduction.
- Access for eligible tenants to Energy Project Plus's Warm Homes Project, that can advise and support tenants struggling with energy bills, and can further support those in financial distress to apply for the installation of white goods and emergency fuel vouchers for prepay customers at risk of self-disconnection.
- Discussion of any energy/fuel related issues that tenants may raise, including follow-up advice if required.
- Providing any information Magenta wanted to offer in regard to the work that has been completed.
- Asking any questions Magenta wanted tenants to answer as part of this resident engagement.

6.38 The activities were to be delivered in several stages:

- **Stage One – Initial Promotion:** Energy Projects Plus proposed to write and deliver an initial, joint-brand letter, on behalf of Magenta Living, providing tenants with an understanding and overview of the advice and support being provided to them.
- **Stage Two - Community Engagement:** Energy Projects Plus proposed to deliver two virtual community events, to facilitate tenants in asking any general questions they have

about the insulation, and energy efficiency in general. It would also allow tenants to share knowledge with each other, and feedback to both Energy Projects Plus and Magenta Living. The events were proposed to last up to 1.5 hours each and to be delivered via Zoom with pre-set dates, promoted in the letter.

- **Stage Three - Exit Campaign:** Energy Projects Plus proposed to write and deliver a further letter to all tenants benefitting from the programme, letting them know the quick-win results of the engagement to date (e.g. any additional energy bill savings through tariff switching), as a final push for any tenants that hadn't yet engaged with Energy Projects Plus.

6.39 Energy Projects Plus proposed also proposed for deliver two reporting activities:

- a virtual event lasting up to 1 hour, to feedback any learning and information to tenants.
- final report to Magenta Living, covering all activities.

6.40 The proposed total cost of all the elements of the programme outlined above was £8,277 plus VAT.

Behavioural Change Activity proposed for Torus

6.41 Funding was set aside for Torus to deliver behavioural change activities and consultation with Torus suggested the specifications were being put together in conjunction with delivery partners.

6.42 However it is understood that Torus did not commission any behavioural change activities across the duration of the project.

Changes in Delivery Approach

The project management team and delivery partners have been flexible and proactive in responding to challenges arising as a result of Covid-19

6.43 As the project progressed the delivery approach adjusted, this was largely due to the impacts of Covid-19. Other than changes required as a result of Covid-19 the housing association project managers commented that changes were limited and that project delivery largely followed the initial project design.

6.44 The project delivery and management staff were quick to respond to the challenges that arose as a result of Covid-19. The following key changes were implemented to project delivery activities

- change in timing of works, which were delayed due to covid
- change in procedures and social distancing to comply with covid guidelines and regulations and keep residents safe
- change in the quantity of housing units receiving RFF measures because of access issues relating to Covid-19

6.45 SMBC estimate that Covid-19 and the EU exit led to delays of c.12 months to project delivery overall. Engagement with the Managing Authority regarding the pandemic was undertaken in March 2020 at the earliest opportunity and the project management team attempted to mitigate the risks as soon as possible. All meetings reverted to virtual ones and the contractors engaged in separate meetings instead of site visits.

- 6.46 There were significant organisational changes to both Magenta and Torus. Magenta went through a restructure and in January 2019 Torus (formerly Helena and Golden Housing Trust) joined forces with Liverpool Mutual Homes through an amalgamation to become the North West's largest Housing provider. However, these changes had little impact on the delivery approach.

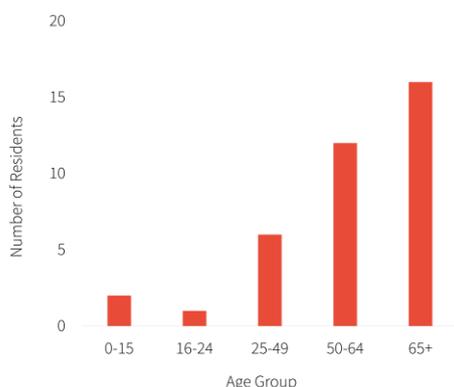
7. The Resident Perspective

- 7.1 This section draws on the evidence gathered through a postal survey undertaken in January 2022. At the time of the survey this was circulated to all residents of the homes that were potentially receiving energy efficiency improvements coordinated by the RFF scheme (470 participants), of which 26 responded. This represents a response rate of 5.5% (+/- 19% margin of error at 95% confidence level).
- 7.2 A postal survey was chosen as it was considered the most feasible method given: the gaps in, data sharing issues, for the data necessary to enable telephone or web surveys; the significantly higher costs of a face to face survey and issues relating to the access to buildings and properties. Although a postal survey also has a number of practical issues (e.g. especially in terms of the scope to maximize the response rate), it was considered a cost effective approach and less likely to lead to age related bias compared to other methods. The survey method was discussed with SMBC and the delivery partners, it was agreed that the postal survey was the only suitable method. It is worth noting it would not be possible or practical to use telephone survey (no access to tenants telephone number), web survey (no access to email addresses, and likelihood of limited use amongst older age groups) and face to face survey (cost and difficulties of getting permission to access buildings and tenant's properties). Hatch explored ways of running the postal survey and agreed that:
- The housing associations would provide addresses of the treated properties;
 - Hatch would arrange dispatch of questionnaire and the Housing associations would be notified before the dispatch;
 - Pre-paid envelopes were to be used and respondents would be entered into a prize draw.
- 7.3 It was not possible to send remainders given the timeframe in which the survey needed to be received and analysed and the time scale required for the delivery of the evaluation report.
- 7.4 The survey focuses on broad themes that cover the quality of building work, satisfaction with the measures implemented and any behavioural changes that have resulted since. There were also opportunities for qualitative responses, focusing on residents' experiences of the consultation process, building works and overall reflections since its completion.

Resident and Household Profile

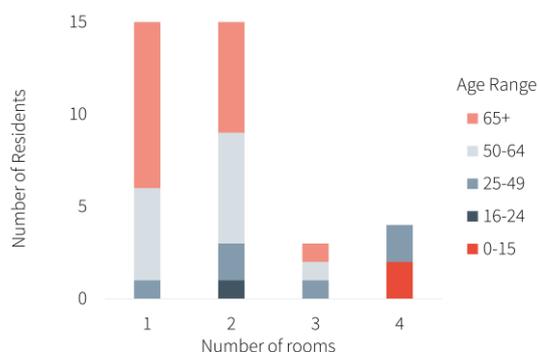
- 7.5 Residents were asked to list the number of people within their household according to age ranges. Figure 7.1 shows that the majority of respondents were within the 65+ age group, with very few households reporting residents under the age of 24. Although the exact age of the respondents is not known, it is possible to calculate an average age of 57 across all households that responded.
- 7.6 Figure 7.2 shows the age ranges within households according to the number of bedrooms in that household. It shows that the majority of 1 and 2 bedroom homes were occupied by older people, whilst the larger homes contained a mix of younger and older people.
- 7.7 In general older residents surveyed tended to live in households where there were a greater number of bedrooms per person, whilst younger people live in households with fewer bedrooms per person. This implies that older residents who responded to the survey were living in homes where there had spare or unoccupied rooms.

Figure 7.1 Age Distribution of Residents



Source: Hatch Resident Survey, January 2022. Q2: “How many people, within each of the following age ranges, live in your household?”, n=23, margin of error=20%.

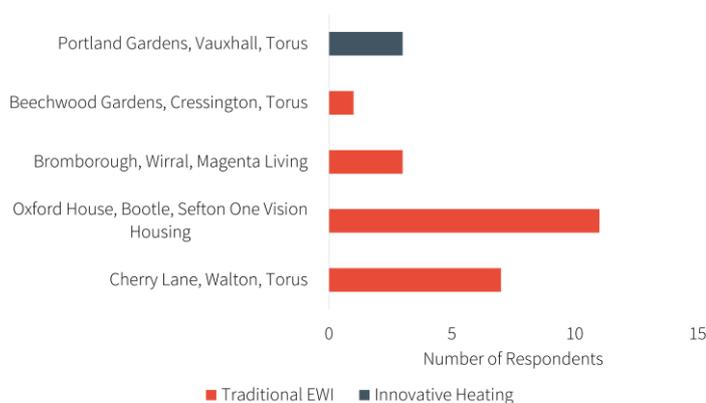
Figure 7.2 Age distribution by number of bedrooms



Source: Hatch Resident Survey, January 2022. Q1: “Including yourself, how many people currently live in your house?” and age ranges from Q2 (see opposite), n= 25, margin of error = 19%.

7.8 Figure 7.3 indicates the buildings in which respondents were living and the measure they received as part of the RFF programme. It confirms that the majority of measures implemented the respondents homes were Traditional EWI, with only one building receiving innovative heating measures. The largest number (11 out of 26) of the survey respondents live in Oxford House (a OVH group building).

Figure 7.3 Building and measures implemented



Source: Hatch Resident Survey, January 2022. Q5: “Which building / RFF project area do you live in?”, n=25, margin of error=19%. Measures derived from resident’s building name.

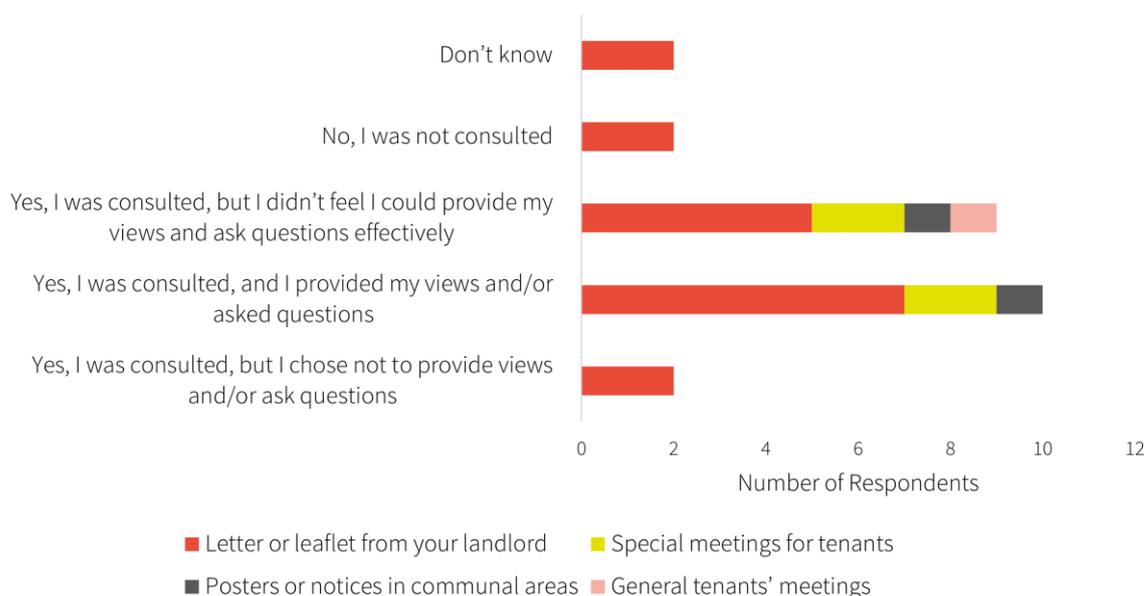
Experiences with the RFF Programme

7.9 Figure 7.4 shows how residents surveyed were contacted about the energy efficiency improvements and to what extent they felt able to provide their views prior to the works beginning.

7.10 The majority of respondents were made aware of the improvements via a letter or leaflet from their landlord, and five residents were made aware through a tenant meeting. The majority of respondents (76%) felt able to provide views or ask questions, although a significant number of respondents did not feel that they could do this effectively (36%). The ability to ask follow-up

questions or provide feedback did not vary significantly according to the way in which the resident was contacted; both meetings and leaflets were represented amongst groups of residents that did and did not feel able to respond effectively.

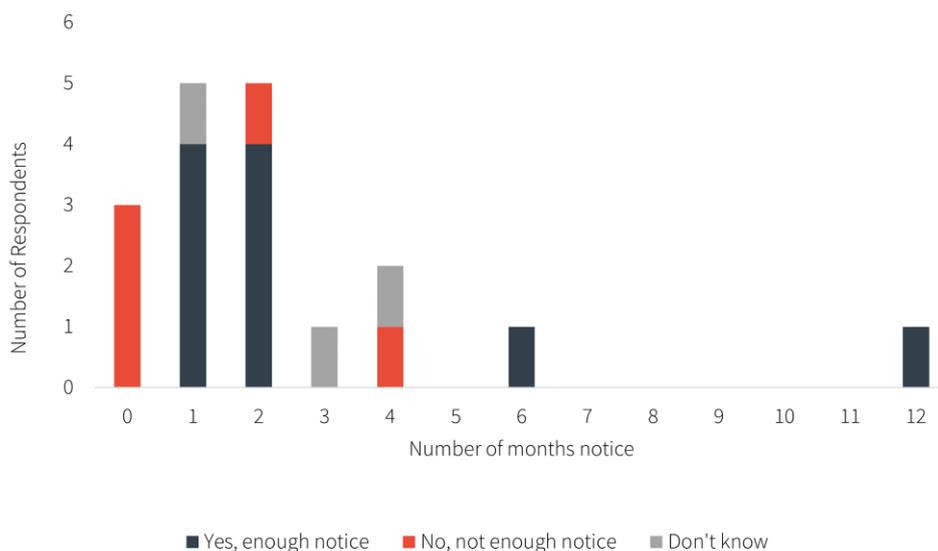
Figure 7.4 Ability to provide feedback by method proposals were shared with tenants



Source: Hatch Resident Survey, January 2022. Q6: “How were you made aware of the energy efficiency improvements to be undertaken by the RFF programme?” and Q7: “Were you consulted before the works began? If you were consulted, were you able to provide views and ask questions about the works?”, n=23, margin of error=19%.

7.11 The majority of residents felt that the notice period was long enough prior to the works starting at their home. However, Figure 7.5 shows that 3 residents who were given less than a month’s notice (reported as 2 weeks in the survey) did not feel this was sufficient. 1-2 months was generally seen as a sufficient notice period prior to the works starting.

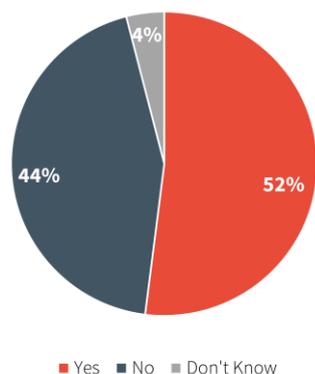
Figure 7.5 “How much notice were you given before the works started at your house?”, and “In your view, do you think this notice period was long enough?”



Source: Hatch Resident Survey, January 2022. Q8a: “How much notice were you given before the works started at your house?” and Q8b: “In your view, do you think this notice period was long enough?”, n=21, margin of error=21%.

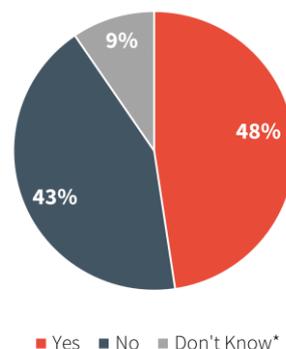
7.12 Figures 7.6 and 7.7 show that only half of the respondents were informed of the potential inconvenience that might be caused by the works. Of those that raised queries, 43% of survey respondents did not feel they were answered or addressed completely.

Figure 7.6 Informed of inconvenience



Source: Hatch Resident Survey, January 2022. Q9: “Were you informed of any potential inconvenience that might be caused by the works (e.g. workers requiring access to the inside of your property, more noise than usual, reduced access to communal areas, temporary loss of heating or lighting, etc)?”, n=25, margin of error=19%.

Figure 7.7 Happy with queries addressed



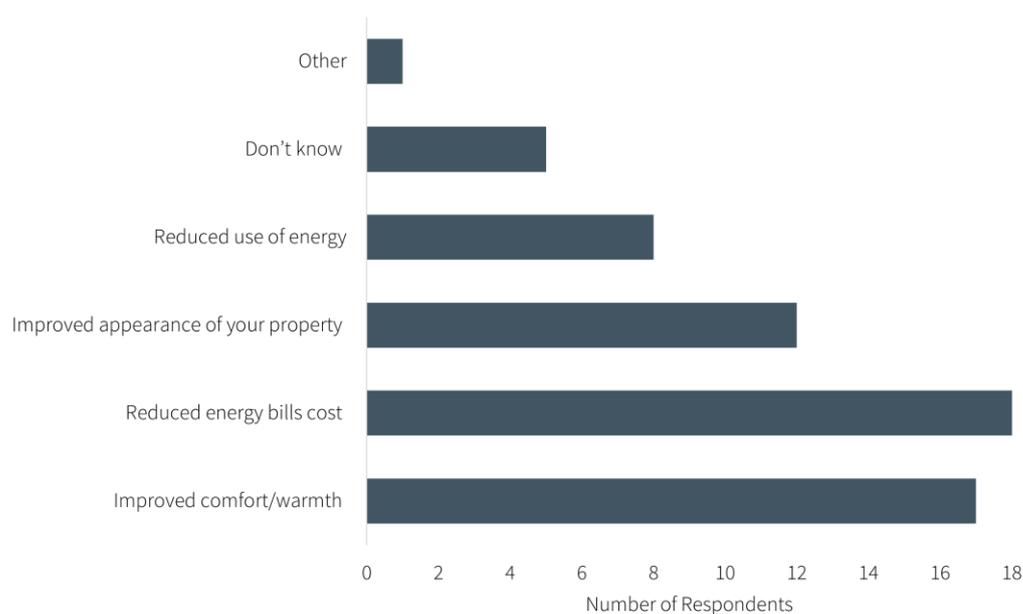
Source: Hatch Resident Survey, January 2022. Q10: “If you raised any queries about the proposed improvements with your landlord or the workers, were you happy with how they were answered/addressed?”, n=24, margin of error=20%. * does not include respondents who didn't raise queries.

7.13 When asked to share anything around the consultation process or inconveniences experienced during the RFF project, two responses referred to their opinion that the housing association had dismissed tenant feedback and the “PR/propaganda” of the consultation meetings. Another primary concern was the untidiness of the work completed and the amount of clean-up required when the workers had left (c.30% of all survey respondents highlighted this as a concern).

The Effect of RFF Works

7.14 Residents were asked to indicate whether they expected any benefits from the energy efficiency improvements, and then indicate their satisfaction with the improvements overall. Figure 7.7 gives an indication of what benefits residents were expecting from the energy efficiency improvements. In general, the majority of respondents expected a reduction in their energy bills and an improvement to comfort and warmth in their home. It is worth noting that not all respondents felt the expected benefits were realised (as discussed in the Outcomes and Impacts section).

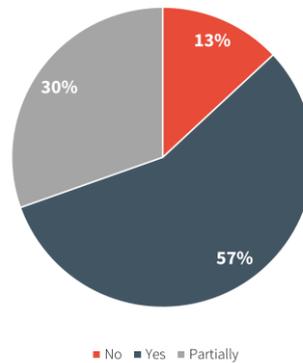
Figure 7.7 Benefits expected from the improvements and satisfaction with works



Source: Hatch Resident Survey, January 2022. Q13: "What benefits were you expecting from the energy efficiency improvements to your home?", n=24, margin of error=20%.

7.15 Figure 7.8 shows how satisfied residents were with the quality of the building work involved in implementing the measures. In general, the majority of respondents (57%) were satisfied with the quality of the building work undertaken.

Figure 7.8 Satisfaction with the quality of building works undertaken



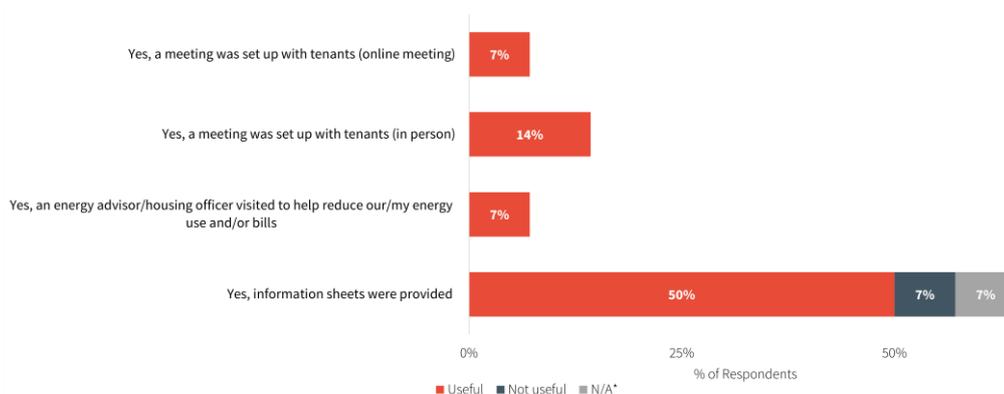
Source: Hatch Resident Survey, January 2022. Q14a: “Are you satisfied with the quality of building work undertaken for these improvements?”, n=24, margin of error=20%.

- 7.16 When asked to share why they were satisfied with the works, respondents reported that:
- Work was done efficiently
 - The workforce was friendly and approachable
 - It was clear a lot of money had been invested.
- 7.17 When asked to share why they were unsatisfied with the works, a small number of respondents (7) provided details which can be summarised as:
- Other elements of the building require substantial work and should have been made a priority over the “cosmetic” work carried out
 - It took a long time, and no notice was given
 - Sections of their home were left uninsulated
 - They have not noticed their home being warmer in winter.
- 7.18 When asked what energy efficiency improvements they would like to see in the future, respondents suggested:
- Solar panels
 - Wind turbines
 - Insulation for basement and loft areas
 - Better education around how to use new systems.
- 7.19 With regards to the final suggestion above, it is worth noting that the behavioural change activities being delivered as part of the programme, which include providing information about how to use new systems, had been delayed due to Covid-19 restrictions and had not yet been fully completed at the time of issuing the resident survey.

RFF Activities

- 7.20 Residents were asked about the advice and assistance they received alongside the improvements in order to reduce energy use or bills. They were asked to reflect on the usefulness of the assistance received and, where relevant, the knowledge and expertise of people that delivered it.
- 7.21 Figure 7.9 shows the types of assistance received and whether they were deemed to be useful. 50% of survey respondents received assistance in the form of an information sheet. Of these, the majority (78%) found them to be useful and 7% found they were not useful. When given the opportunity to expand on their answers, one respondent found it difficult to find the leaflet and another noted that it would be difficult for elderly residents to use without in-person instructions.

Figure 7.9 Assistance received and whether it was useful

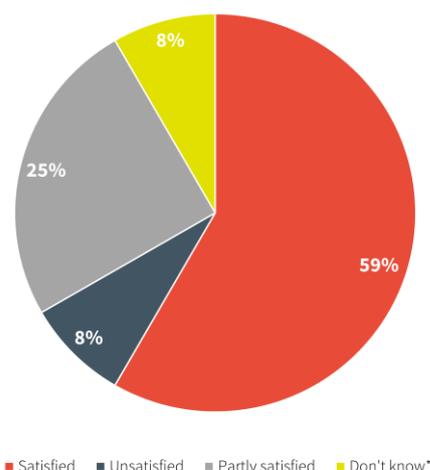


Source: Hatch Resident Survey, January 2022. Q16: “Alongside the RFF improvements, did your landlord explain the improvements to you, and have you received any assistance or advice with reducing your energy use?” and Q17: “If you received assistance/advice, did you find it useful?”, n=16, margin of error=24%.

*does not include respondents who didn’t receive assistance.

- 7.22 It is worth noting that a significant proportion of residents did not feel they had received any assistance or advice alongside the RFF improvements, but that this could reflect the stage at which the survey was undertaken (as behavioural change activities had commenced but had not yet been completed).
- 7.23 Figure 7.10 shows how residents assessed the level of knowledge and expertise involved in providing any assistance they received. Of those that received assistance, the majority (59%) felt satisfied with the level of knowledge and expertise involved. It is worth noting that some of those who did not receive assistance still answered this question to say they were unsatisfied with the knowledge and expertise provided, which implies that respondents wished to emphasise that a lack of assistance was unsatisfactory.

Figure 7.10 Satisfaction with knowledge and expertise



Source: Hatch Resident Survey, January 2022. Q18: “Were you happy with the knowledge and expertise of the people that delivered the assistance/advice?”, n=23, margin of error=20%. Data represents respondents who stated they had received some of form of assistance.

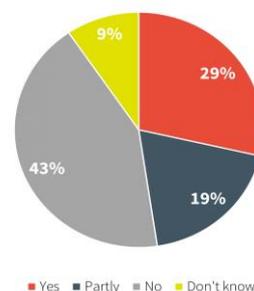
*does not include respondents who didn't receive assistance

7.24 Residents were asked if the activities they participated in led to any long-term changes in the way they use energy.

7.25 Figure 7.11 shows that the majority of survey respondents felt that this was the case either partly or fully. However, 43% felt that they have not made any long-term changes to their energy use as a result of the activities.

7.26 Few residents expanded on their answer to this question, although two referenced the installation of their smart meter as a specific factor that had helped them to make long-term changes to improve their energy use.

Figure 7.11 Changes to energy usage



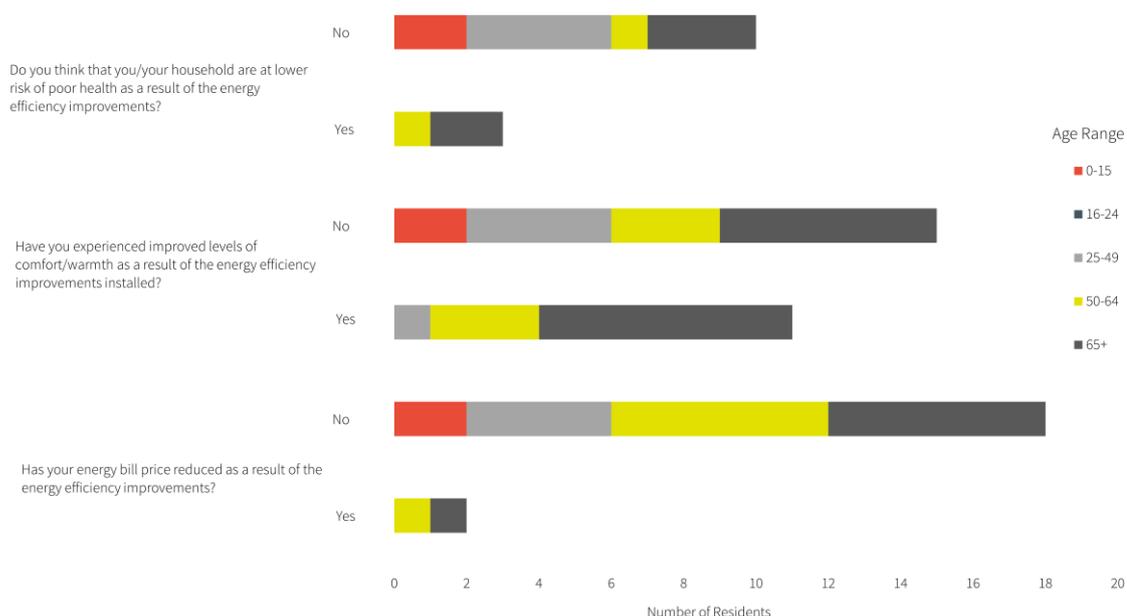
Source: Hatch Resident Survey, January 2022. Q19i: “Have the activities you participated in led you to make any clear / long term changes in the way that you use energy?”, n=23, margin of error=20%.

Outcomes and impacts from survey findings

7.27 The final section of the survey explored the outcomes of the programme in terms of energy usage, energy bills, comfort/warmth, health and the proportion of income spent on energy.

7.28 Outcomes relating to a reduction in poor health and the cost of energy bills were not widely reported. However, improved levels of comfort and warmth were reported by 46% of respondents, the majority of which were over the age of 65. In general, the age distribution of the household did not seem to vary by any particular outcome relating to the improvements.

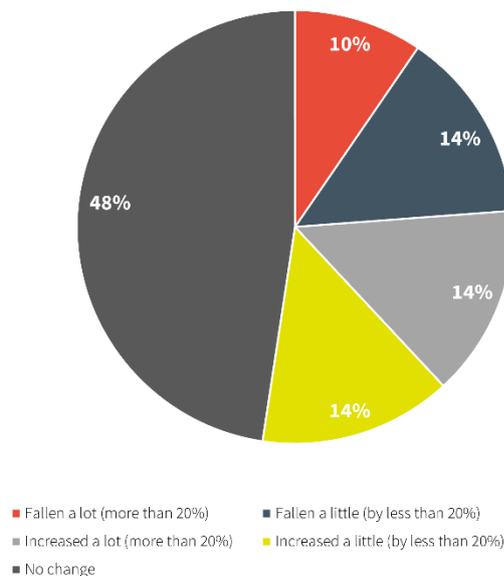
Figure 7.12 Household outcomes by age group



Source: Hatch Resident Survey, January 2022. Q21: “Has your energy bill price reduced as a result of the energy efficiency improvements?”, Q22: “Have you experienced improved levels of comfort/warmth as a result of the energy efficiency improvements installed?”, Q23: “Do you think that you/your household are at lower risk of poor health as a result of the energy efficiency improvements?”, n=23, margin of error=20%.

- 7.29 52% of the residents that responded to the survey had noticed a change in the amount of energy they used since the energy efficiency measures had been installed. Around a quarter found that their energy usage had dropped (of which just under a half indicated that it had fallen by more than 20%) whilst another quarter had noticed an increase in their energy usage. This could reflect the rebound effect (ie whereby improvements in energy efficiency can encourage a change in behaviour towards increased use meaning the gains made by the new measures are offset by changes in behaviour, indicating that it is not sufficient to improve technology without supporting behavioural change activities). It should be noted that some respondents may have been conflating energy use with cost and therefore the responses should be treated with a degree of caution.
- 7.30 However, several respondents did not answer this question and one noted that they could not tell due to the way their energy use is metered. OVH residents’ energy costs are based on an annual charge which at the time of the survey had not yet reflected the changes that may have been brought about by the RFF measures.

Figure 7.13 Changes to energy usage since energy efficiency improvements



Source: Hatch Resident Survey, January 2022. Q20: "As far as you are aware, has your household's use of energy (for heating purposes) changed due to the energy efficiency improvements made to your house?", n=23, margin of error=20%.

7.31 A household is considered to be fuel poor if¹⁵:

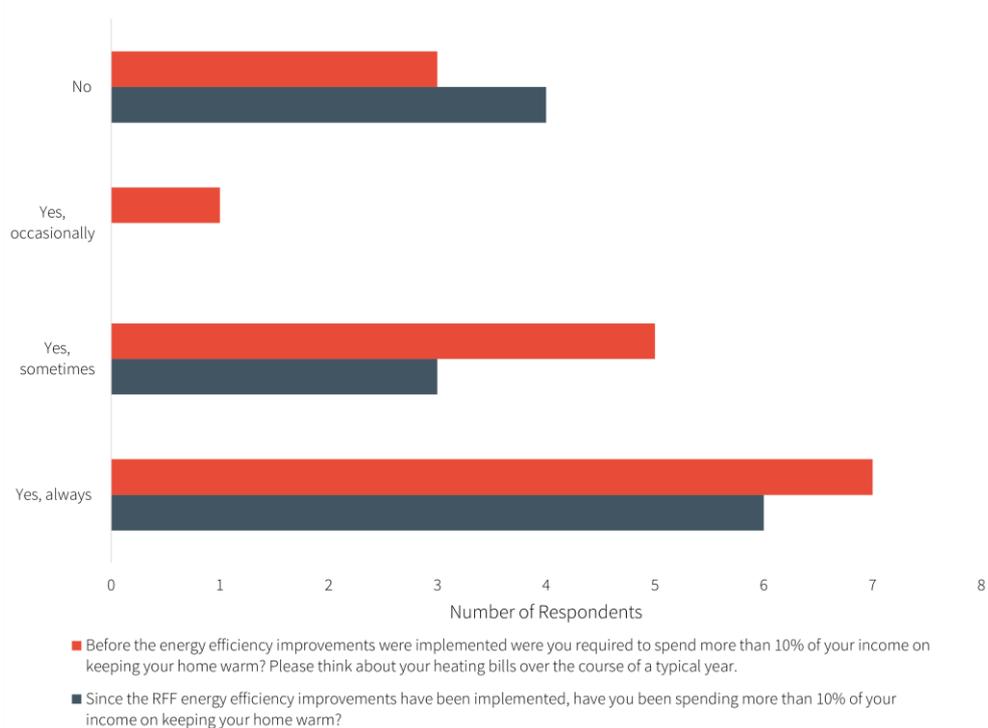
- in order to maintain a satisfactory heating regime, total fuel costs necessary for the home are more than 10 per cent of the household's adjusted (after housing costs) net income; and
- if after deducting fuel costs, benefits received for a care need or disability and childcare costs, the household's remaining adjusted net income is insufficient to maintain an acceptable standard of living. The remaining adjusted net income must be at least 90 per cent of the UK Minimum Income Standard (MIS) to be considered an acceptable standard of living, with an additional amount added for households in remote rural, remote small town and island areas (RRRSTI).

7.32 For the purpose of this evaluation survey respondents spending more than 10% of their income is used as the key indicator of fuel poverty.

7.33 The number of survey respondents spending more than 10% of their income on keeping their home warm fell marginally since the improvements. 15% of residents that responded to the survey noted a reduction in their spending on energy relative to their income. However, a significant number of residents responded that they didn't know for one or both of the scenarios indicating that an accurate picture of the impact of the improvements on spending is difficult to obtain. In just one case a resident reported that they now spend more than 10% of their income on heating where they didn't before the improvements.

¹⁵ [Annual Fuel Poverty Statistics LILEE Report 2021 \(2019 data\) \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/71111/annual-fuel-poverty-statistics-lilee-report-2021-2019-data.pdf)

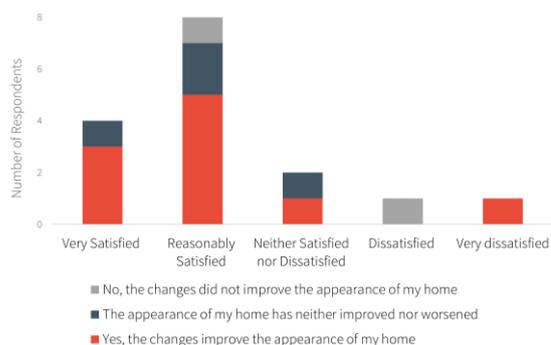
Figure 7.14 Changes to spending on energy as a proportion of income since the improvements



Source: Hatch Resident Survey, January 2022. Q26a: “Before the energy efficiency improvements were implemented were you required to spend more than 10% of your income on keeping your home warm? Please think about your heating bills over the course of a typical year” and Q26b: “Since the RFF energy efficiency improvements have been implemented, have you been spending more than 10% of your income on keeping your home warm?”, n=21, margin of error=21%.

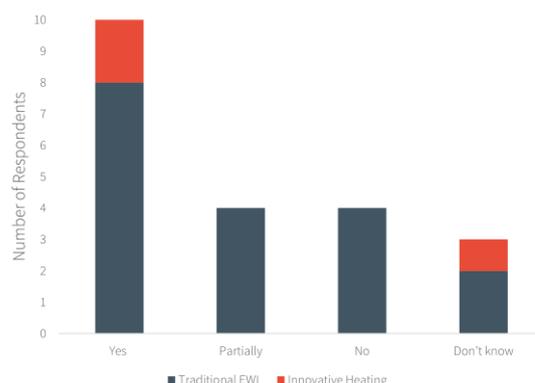
- 7.34 In general, residents that responded to the survey were very satisfied or reasonably satisfied with the quality of the building works undertaken as part of the RFF programme. This is the case regardless of whether the works improved or worsened the appearance of their home. Two residents responded that they were dissatisfied or very dissatisfied with the quality of the building works, despite one of these residents noting an improvement to the appearance of their home.
- 7.35 Figure 7.15 shows how residents responded when asked if they were satisfied with the energy efficiency improvements overall. In general, residents who received the Traditional EWI measures were satisfied or partially satisfied with the improvements, and those receiving the Innovative Heating measures were satisfied or not sure of their response. The performance of new storage heaters was cited as a reason for being satisfied with the improvements.

Figure 7.15 Satisfaction with building works and appearance of home (if appearance of home changed)



Source: Hatch Resident Survey, January 2022. Q25: “If you answered yes in the previous question [if appearance of home changed], are you pleased with any changes to the visual appearance of the building or your home?” and Q27: “How satisfied are you with the quality of building works undertaken as part of your RFF energy efficiency improvements?”, n=21, margin of error=21%.

Figure 7.16 Satisfaction with energy efficiency improvements



Source: Hatch Resident Survey, January 2022. Q28a: “Overall, are you satisfied with the energy efficiency improvements which have been made to your home?”, n=24, margin of error=20%. Measures derived from the resident’s building name.

7.36 Of those that were not satisfied with the improvements, the following comments were made:

- The ground floor flats have not received energy efficiency improvements and there was a reference to concerns around damp
- The insulation has made the building (Oxford House) too hot in the summer
- Humidity extractors have made the building (Oxford House) colder by removing warm air
- Whilst providing more control, the new heaters are now very complicated to use.

7.37 Some of the comments raised within the survey (including the final comment above) point to the importance of delivering the behavioural change activities to support residents to understand how to use new measures which have been installed and ensure they are making the most of the energy efficiency improvements.

8. Outcomes and Impacts

- 8.1 This section sets out the progress made towards the core and wider outcomes and impacts set out in the programme's logic model.
- 8.2 The core impacts generated by the project were:
- improved energy efficiency;
 - reduced energy usage; and
 - reduced greenhouse gas emissions and the associated societal welfare benefit.
- 8.3 We also explore the wider effects of RFF in terms of:
- fuel poverty alleviation;
 - increased resident comfort and well-being; and
 - improvements in the aesthetic of the affected housing stock.
- 8.4 In addition, this section includes an assessment of the programme's cost effectiveness and value for money. This draws on modelling undertaken by Hatch to place a monetary value on the GHG reduction that is estimated to be achieved by RFF up to 2050. This is then compared to the level of ERDF funding to generate the value for money. The approach to the value for money assessment is explained in more detail below. The cost effectiveness is shown by analysis of cost per property, reduced energy consumption estimates and payback period and is also explained in more detail below.

Core Impacts

- 8.5 Based on the contracted target up to Q1 2022, the core target outcomes of RFF were to deliver 505 households benefiting from improved energy consumption with an annual decrease in GHG of 222 tCO₂. This was adjusted from the original contracted target of 506 households benefiting from improved energy consumption with an annual decrease in GHG of 231 tCO₂.
- 8.6 The final contracted target including Phase 2 was 1024. However Phase 2 of RFF closed early without any capital works being delivered or claimed. This meant that no outputs for Phase 2 could be captured. Therefore, this evaluation focuses on the output figures captured in contracted targets up to Q1 2022, with a commitment to deliver works to 505 homes and save 222 tCO₂.

Improved Energy Efficiency

Methodology

- 8.7 The actual number of properties (by individual address) supported by the project which have achieved an improved energy consumption classification was calculated. The improvement was measured by the SAP rating for the property. This is in line with the ESIF 'Output Indicator Definitions Guidance for the European Regional Development Fund for England' methodology.
- 8.8 A detailed independent assessment of the properties was undertaken at the start of the project (pre-EPCs) to establish the baseline SAP scores. Then a further independent assessment was undertaken at the end of the project (post EPCs) to calculate the change in SAP rating. The pre and post EPCs have been reviewed to ensure SAP uplift occurred and that they are eligible to claim as outputs.

- 8.9 It was agreed at the start of the project, with DLUHC, that a sample of EPCs would be sufficient, across archetypes, for each scheme to calculate an average improvement per property. DLUHC agreed to an average of 25%.
- 8.10 EPC bands and SAP ratings were measured for a sample of RFF households. For the project overall, 248 houses were measured in the pre/post intervention sample. Notably, there was significant variance in the sample size across the schemes. Torus – Innovative Heating scheme had a sample size of 11% whereas Torus Cherry Lane had a sample size of 96%. Overall, the sample size of 248 represented 56% of the actual number of households with improved energy consumption classification. This significantly exceeded the average of 25% agreed with DLUHC.
- 8.11 The RFF bid calculated the ‘proposed’ GHG/Carbon saving output based on the data held by the Registered Providers and experience of carbon reductions made in a previous ERDF retrofit project (REECH).
- 8.12 Similarly, to the C31 output above, the bid set out that an independent assessment would be used to measure GHG reductions. This independent assessment was in the form of pre and post installation EPC’s, carried out by a registered EPC assessor. The CO2 emissions was measured the before and after GHG impact.
- 8.13 This methodology is a slight divergence to the C34 output methodology set out in the ESIF ‘Output Indicator Definitions Guidance for the European Regional Development Fund for England’. The ESIF methodology relies on the measurement of primary energy savings then converting those savings into carbon using BEIS conversion factors. The project encompasses 445 individual homes, but it was not possible to obtain the actual primary energy saving from each of the 445 homes. Therefore, the alternative method above was agreed at the start of the project (in the bid).
- 8.14 DLUHC agreed that a sample of EPCs would be sufficient for each scheme to calculate an average saving per property. There were no proposed C34 carbon saving output for the Torus Portland Gardens innovative scheme as it would be difficult to evidence the carbon savings for this scheme using an EPC.

Outcome and impact

- 8.15 Table 8.1 sets out the overall performance against the ERDF delivery C31 target. Although RFF delivered less than its target (by 12%) it still fell within the threshold of 15% variance from the delivery target set by ERDF guidance and therefore has achieved its energy efficiency objective.

Target number of households with improved energy consumption classification (C31)	505
Actual number of households with improved energy consumption classification (C31)	445
No. of households underdelivered compared to target	60
% of households benefitting from improved energy consumption compared to target	88%

- 8.16 A breakdown of household improved energy consumption by scheme is provided in Table 8.2. The majority of schemes reached >90% of proposed houses benefitting from improved energy consumption. However, notably only 43% of households within the Torus- Underfloor scheme experienced improved energy consumption. This was largely due to Covid-19 related access

issues and issues with moisture preventing installation for the external wall insulations scheme (explained more in Section 6).

	Proposed	Actual	% of proposed
OVH	90	90	100%
Magenta	84	82	98%
Torus – Underfloor	94	40	43%
Torus – Beechwood	36	36	100%
Torus - Innov Heating	36	36	100%
Torus - Cherry Lane	54	54	100%
Torus – EWI	111	107	96%
Total	505	445	88%

- 8.17 Table 8.3 presents the average SAP ratings (the mean) of these households. The data suggests that the schemes improved efficiency across households, as average (mean) SAP ratings increased from 68 to 76.

	SAP ratings (Mean)		SAP improvement	Sample size
	Pre intervention	Post intervention		
OVH	72	82	10	54
Magenta	52	69	16	25
Torus – Underfloor	62	67	5	8
Torus – Beechwood	70	76	5	32
Torus - Portland	68	74	6	4
Torus - Cherry Lane	73	78	5	52
Torus – EWI	67	72	5	73
Total RFF project	68	76	7	248

Note: Numbers may not sum due to rounding.

- 8.18 Based on the sample of data (no=248) from properties where both pre efficiency and post efficiency was modelled, the percentage of properties in higher EPC Bands significantly improved following the RFF intervention. Following the RFF intervention 93% of properties in the sample are now in Band C or above compared to 60% before the RFF project. The table below illustrates this improvement in more detail.

EPC	% pre RFF	% post RFF
A	0%	0%
B	4%	24%
C	56%	69%
D	31%	7%
E	8%	0.4%
F	0.4%	0%
G	0.4%	0%

Note: SAP data is based on a sample of information for each scheme.

- 8.19 With regard to the LJMU monitoring data the refurbishment of Oxford House led to an estimated energy saving of about 24% on average¹⁶.

Reduced greenhouse gas emissions

- 8.20 A core outcome of RFF was to deliver a target of 222 tonnes of greenhouse emissions abatement per annum. This is measured using carbon dioxide equivalent (CO₂e) which covers a wide range of GHG that have an impact on climate change.
- 8.21 The estimated level of GHG reduction is based on the amount of CO₂e saved in a given year, i.e. a projection of estimated savings of either one year following project completion or the calendar year after project completion through a methodology agreed by appraisers (noted in the methodology section above).
- 8.22 Before the RFF project began the target level of GHG reduction was calculated. The estimation for GHG reduction was based on the data held by the Registered Providers and interpreted using the SAP2012 methodology¹⁷.
- 8.23 The same methodology was used to project the increased rating based on the envisaged project activity (including factoring) to project estimated baseline and projected saving for one year. For some of the measures the projected reduction may be a conservative estimate, given the innovative nature of some the products utilised.
- 8.24 RFF delivered more than its delivery target (356 tonnes CO₂e reduction compared to target of 222 tonnes CO₂e or +161% above target) set by ERDF and therefore has achieved its energy efficiency objective.

Target estimated GHG reductions (tonnes) (C34)	222
Actual estimated GHG reductions (tonnes) (C34)	356
Over delivery of estimated GHG reductions (tonnes)	134
% Achieved of target estimated GHG reductions	161%

- 8.25 A breakdown of the reduced greenhouse gas emissions by scheme is provided below:

Table 8.6 Reduced greenhouse gas emissions by Scheme (in Carbon dioxide equivalent tonnes)

¹⁶ LJMU, 2021, Post Retrofit comparison Report on Oxford House.

¹⁷ [Microsoft Word - SAP 2012 October 2013 with RdSAP_19 Dec 2014_with changes accepted.doc \(bre.co.uk\)](#)

	Proposed	Actual	%	Average GHG reduction per property per year
OVH	22	68	309%	0.76 tCO2
Magenta	58	149	257%	1.82 tCO2
Torus – Underfloor	15	23	153%	0.58 tCO2
Torus – Beechwood	20	21	105%	0.59 tCO2
Torus - Innov Heating	0	0	N/A	N/A
Torus - Cherry Lane	19	31	163%	0.58 tCO2
Torus – EWI	88	64	73%	0.60 tCO2
Total	222	356	161%	

Reduced GHG emissions and the associated societal welfare benefit

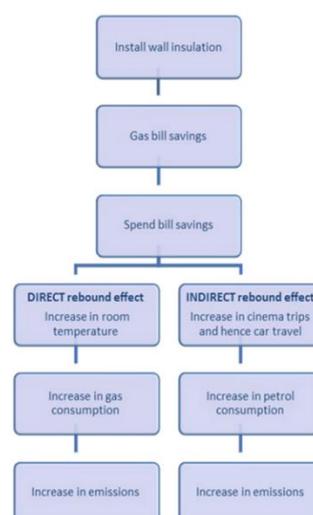
8.26 Each RFF scheme assessed GHG emissions (in CO2 equivalent) for a sample of properties before and after RFF measures were installed. The assessment utilises this data to estimate the reduction in emissions brought about as a result of the project.

8.27 In the first instance, reductions in GHG emissions were calculated from the sample of properties and scaled to the total number of properties under each RFF scheme. This factored in a direct rebound effect (illustrated in Figure 8.1) which accounted for potential increases in emissions resulting from the additional funds that residents were able to spend on increasing the warmth of their home.

8.28 This was an important factor to include as direct rebound effects are typically more relevant for low-income residents who suffer from fuel poverty.

8.29 Government guidance on valuing direct rebound effects¹⁸ suggested that for household heating in developed countries, the direct rebound effect is expected to be between 10-30%. As the RFF scheme incorporated implementations to work with residents to reduce energy consumption, a mid-point rebound effect of 20% was applied.

Figure 8.1 Rebound effect



Source: [Valuation of energy use and greenhouse gas emissions \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441111/green-book-supplementary-guidance-valuation-of-energy-use-and-greenhouse-gas-emissions.pdf)

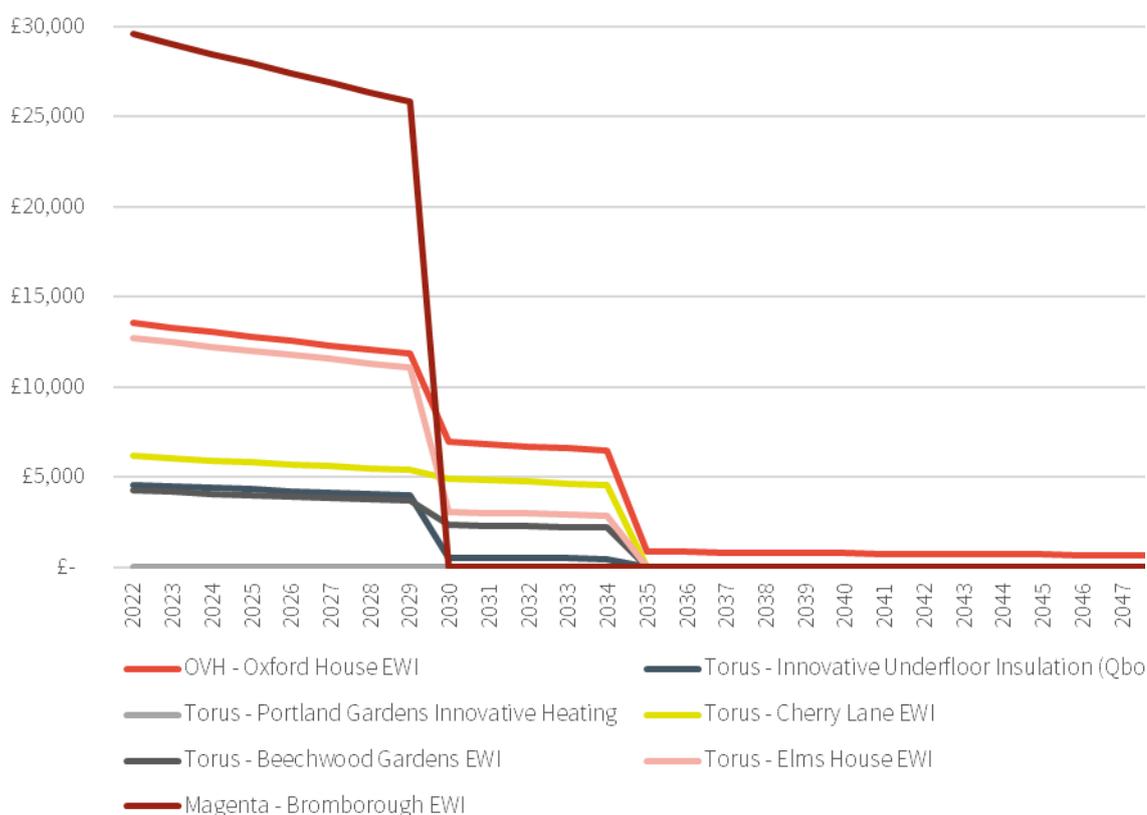
¹⁸ [Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/441111/green-book-supplementary-guidance-valuation-of-energy-use-and-greenhouse-gas-emissions.pdf) and [S4134 \(d2e1qxpsswcpgz.cloudfront.net\)](https://www.cloudfront.net/s4134/d2e1qxpsswcpgz)

Counterfactual

- 8.30 Following the Green Book guidance, the value of GHG abatement was then compared against a counterfactual scenario (projected to 2050) to understand the impact of RFF against a situation whereby RFF did not take place.
- 8.31 The counterfactual scenario used within RFF's Value for Money model assumed that alternative policy interventions would take place to upgrade stock to a certain level of efficiency by 2030/2035. This was implied by the British Energy Security Strategy ambitions (2022): *"As many fuel poor homes as reasonably practicable to Band C by 2030. As many homes to reach EPC B and C as possible by 2035"*.
- 8.32 As such, the counterfactual took the assumption that all properties with an SAP rating below Band C would be upgraded to Band C in 2030 and all properties with an SAP rating below Band B would be upgraded to Band B in 2035. I.e., the counterfactual model presumed that:
- If there was no RFF intervention there would be no equivalent energy efficiency intervention between 2021-2029,
 - Houses with an EPC Band of D or lower would have benefitted from alternative policy to reach Band C across 2030-2034, and
 - Houses with an EPC Band of C would have benefitted from alternative policy to reach Band B across 2035-2050.
- 8.33 To factor in the counterfactual, EPC bands were identified using "current efficiency potential rates (pre-intervention)" against UK energy efficiency rating band definitions and properties Band D or lower for the 2030-2034 period and Band C or lower for the 2035-2050 period were discounted from contribution towards economic benefits. This significantly reduced the benefits attributed from 2030 onwards (as is evident in Figure 8.2).
- 8.34 The model then applied BEIS's carbon values¹⁹ and a 3.5% discount rate to 2050 in order to assess the total monetary valuation associated with CO₂ abatement within RFF.
- 8.35 When taking into account the rebound effect and well as the counterfactual the RFF project is estimated to lead to 2750-3,000 tCO₂e reduction over the period from 2022-2050. Based on the method and modeling set out above the social welfare benefit associated with GHG reduction brought about by the RFF project's carbon savings is estimated to be in the region of £0.63m. Figure 8.2 shows the scale of this benefit spread across the period from 2022 to 2050 and is broken down by RFF scheme.

¹⁹ [Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/90447/gb-supplementary-guidance-valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal.pdf) Table 3: Carbon values and sensitivities 2020-2100 for appraisal, 2020£/tCO₂e

Figure 8.2 Discounted net CO2 abatement benefits, by project, 2022-2050



Source: Sefton Metropolitan Borough Council, 2023.

Wider Impacts

Fuel poverty alleviation

8.36 A household is considered to be fuel poor if²⁰:

- 1) in order to maintain a satisfactory heating regime, total fuel costs necessary for the home are more than 10 per cent of the household's adjusted (after housing costs) net income; and
- 2) if after deducting fuel costs, benefits received for a care need or disability and childcare costs, the household's remaining adjusted net income is insufficient to maintain an acceptable standard of living. The remaining adjusted net income must be at least 90 per cent of the UK Minimum Income Standard to be considered an acceptable standard of living, with an additional amount added for households in remote rural, remote small town and island areas.

8.37 For the purposes of this evaluation the 10% indicator (outline in point 1 above) is used firstly to gauge the base level of fuel poverty of residents and secondly to assess the impact RFF has had and will continue to have on the alleviation of fuel poverty. Hatch asked the resident survey respondents:

²⁰ [Annual Fuel Poverty Statistics LILEE Report 2021 \(2019 data\) \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101442/annual-fuel-poverty-statistics-lilee-report-2021-2019-data.pdf)

- “Before the energy efficiency improvements were implemented were you required to spend more than 10% of your income on keeping your home warm? Please think about your heating bills over the course of a typical year”, and
- “Since the RFF energy efficiency improvements have been implemented, have you been spending more than 10% of your income on keeping your home warm?”.

- 8.38 According to the survey results, the number of survey respondents spending more than 10% of their income on keeping their home warm fell marginally since the RFF improvements. 15% of residents that responded to the survey noted a reduction in their spending on energy relative to their income. However, a significant number of residents responded that they didn’t know for one or both of the scenarios indicating that an accurate picture of the impact of the improvements on spending is difficult to obtain. In just one case a resident reported that they now spend more than 10% of their income on heating where they didn’t before the improvements. It should also be noted that OVH Oxford House residents’ energy bills are charged annually. As a result, at the time of the survey distribution, many of the OVH Oxford House residents may not have seen cost savings brought about as a result of RFF measures.
- 8.39 The energy fuel crisis adds an additional layer of complexity and importance, given that at the time of the distribution survey energy prices were rising significantly above the level of (already high) UK inflation. Assuming the reduction in energy consumption laid out in the core RFF outcomes above the RFF measures is likely play a role in helping alleviate fuel poverty in periods where energy prices rise significantly over and above normal inflation levels (such as in early 2022). Therefore, it is anticipated that RFF will play an important role in helping alleviate fuel poverty of many of the recipient tenants although the scale at which this will occur is uncertain.

Increased resident comfort and well-being

- 8.40 As stated by (Ormandy and Ezratty, 2012):
- “Thermal discomfort is not just a lack of satisfaction with the ambient temperature but reflects a situation where there is a potential threat to health – that is when the temperature falls below 18°C or rises above 24°C for a period of time.”*
- 8.41 This range is based on the World Health Organization’s guidance on thermal comfort for the home environment, which is aimed at protecting health, particularly the health of those most susceptible to low or high temperatures (Ormandy and Ezratty, 2012).
- 8.42 The results from the survey are based on a small sample size and should be treated with a degree of caution. Improved comfort and wellbeing are particularly important to elderly residents and children as these demographic groups are at generally at higher risk of health issues associated with cold living conditions. It should be noted that that based on the resident survey data the majority of residents were within the 65+ age group, with very few households reporting residents under the age of 24. Although the exact age of the respondents is not known the estimated average age is 57 across all households that responded. In addition, based on the survey data, 9% of residents were children (between the ages of 0 and 15).
- 8.43 To gauge the impact on resident comfort and well-being the survey asked residents:
- “Have you experienced improved levels of comfort/warmth as a result of the energy efficiency improvements installed?”, and
 - “Do you think that you/your household are at lower risk of poor health as a result of the energy efficiency improvements?”.

- 8.44 The survey responses indicated that more residents (58% of respondents who answered ‘yes’ or ‘no’) have not experienced improved levels of comfort/warmth as a result of the RFF energy efficiency improvements than have which suggests that the impact of increased resident comfort and well-being may have been limited in many cases. Despite this 42% of survey respondents indicated that they had seen improved levels of comfort/warmth as a result of the energy efficiency improvements installed. Please note the delay in the behavioural aspects of the schemes which may have had an impact in terms of the awareness of the tenants.
- 8.45 The survey responses also indicated that residents generally felt they are no less at risk of poor health due to the RFF energy efficiency improvements as only 23% of respondents who answered ‘yes’ or ‘no’ to this question thought that their household is at lower risk of poor health as a result of the energy efficiency improvements. However just as many respondents answered ‘don’t know’ to as ‘yes’ or ‘no’ this may indicate many residents may not consider themselves to be at risk in the first place.
- 8.46 In addition, the LJMU monitoring data also showed evidence of increased resident comfort and wellbeing. the motoring data showed a decrease in relative humidity, which suggests an improvement in indoor air quality and overall comfort level. The decreased probability of humidity exceeding the unhealthy limit of 70% is a positive sign for the health and well-being of the residents²¹.

Improvements in the aesthetic of the affected housing stock.

- 8.47 The before and after images below visually demonstrate the aesthetic improvements to the housing stock brought about by RFF. The images were provided by SMBC in March 2023.

Figure 8.3 Magenta (before)



Figure 8.4 Magenta (after)



²¹ LJMU, 2021, Post Retrofit comparison Report on Oxford House.

Figure 8.5 Beechwood Gardens (before)



Figure 8.6 Beechwood Gardens (after)



Figure 8.7 Oxford House (before)

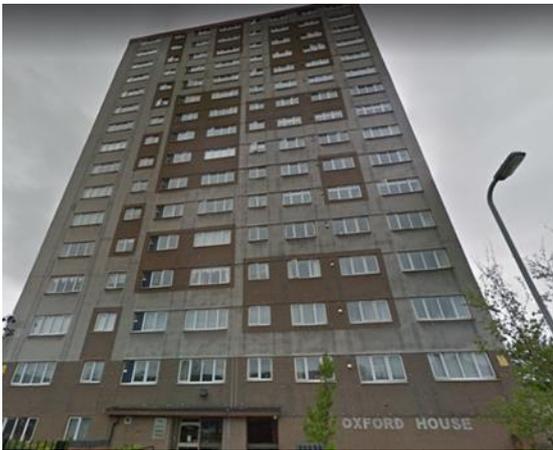


Figure 8.8 Oxford House (after)



Figure 8.9 Torus EWI (after)



Figure 8.10 Cherry Lane (after)



- 8.48 As for fuel poverty and resident comfort and well-being above, this evaluation has used the resident survey to gauge opinions on the effect of the RFF investment on their housing, whether there has been an improvement or any deterioration.
- 8.49 Figure 7.15 provides resident insights with the satisfaction levels of the change of appearance of their homes. Of the 16 residents who were surveyed and felt there had been a change in the appearance of their home:
- 63% (or 10 of 16) felt the RFF project has resulted in an improved appearance to their home,
 - 25% of (or 4 out of 16) felt the appearance of their home has neither improved nor worsened as a result of RFF, and
 - 13% of (or 2 out of 16) felt the appearance of their home has neither improved nor worsened as a result of RFF.
- 8.50 Based on the survey results and consultations undertaken with delivery partners and SMBC it can be concluded that where RFF measures have impacted aesthetics, the RFF measures have generally brought about improvements to the properties where changes to the appearances of the home were made.

Cost Effectiveness and Value for Money

- 8.51 This quantitative element of the evaluation incorporates the benefits of RFF that can be monetised and compares this to the public cost of RFF. This generates a value for money of RFF for every £1 invested. The method for assessing this is outlined below. The method is based on the Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government²² and is therefore Green Book compliant.
- 8.52 This section also evaluates the cost effectiveness of RFF by providing analysis of cost per property, reduced energy consumption estimates and payback period.

²² [Valuation of energy use and greenhouse gas emissions \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444444/Valuation_of_energy_use_and_greenhouse_gas_emissions.pdf)

Value for Money

- 8.53 Table 8.6 shows the total monetised benefit of RFF, as well as the total ERDF investment expected by 2050. By comparing the total discounted benefit of RFF (£0.63m) to the total ERDF investment at project closure (£2.25m) it is estimated that RFF generated £0.28 for every £1 of ERDF funding.

Total net benefit of RFF associated with GHG reduction (2022-2050) (£ million)	Total ERDF RFF investment (£ million)	Value for Money (£ of benefit per £ of ERDF investment)
£0.63	£2.25	£0.28

Source: Hatch, 2023

- 8.54 The 2016 DCLG Appraisal Guide suggests that anything exceeding a £2 return on public investment represents high value for money. On this basis, these estimates of RFF's net additional return on public investment would be judged as low. However important elements of the economic return on investment have not been able to be fully captured such as potential benefits from health, improvements to aesthetics and reduction of fuel poverty which mean assessing the overall return on public investment is highly challenging and in reality, the actual value for money would be significantly higher than is reflected in the £0.28 per £1 noted above. It should also be stressed that these calculations for value for money only cover the long term societal benefit achieved by reduction in GHG emissions and the project was able to exceed the ERDF target level for reduction in GHG emissions. When accounting for the significant wider benefits of the project it is estimated that the overall value for money of the project will be medium in the long run.

Cost Effectiveness

- 8.55 This section assesses the cost effectiveness of the RFF project by analysing the cost per property receiving intervention, the cost of current energy reduction and the payback period of intervention (the years required to recoup costs per property based on reduced energy use net of rebound effect).
- 8.56 In total, 445 properties were reached within the RFF project (Number of households with improved energy consumption). With the total ERDF RFF Investment being £2.25m, this equates to an average ERDF spend of just over £5,000 per house on RFF improvements which is 13% higher than would have been the case if the project reached the proposed 505 properties. Further, as the net reductions in emissions for the project totals 2,750-3,000 CO₂ tonnes across 2022-2050, 1 tonne of CO₂ emissions are expected to be reduced for every £880 of ERDF expenditure spent.
- 8.57 As prior Value for Money findings show that £1 of ERDF investment will lead to £0.28 of benefit, the RFF project is unlikely to recoup its costs per property across any given payback period based on benefits brought to society by GHG emissions reduction alone. However, as described earlier, this Value for Money figure excludes significant wider benefits to society (reduced fuel poverty, improved aesthetic of the LCR housing stock, and GVA created through capital investment). There is a possibility that if these wider benefits are included, costs may be recouped via wider

benefits to society. Nonetheless, without monetisable benefits, the payback period under this scenario is uncertain.

Limitations of the Impact Assessment

- 8.58 It is important to recognise that there are a range of limitations in undertaking an impact assessment of this nature, which need to be borne in mind when considering the findings of the assessment.

Robustness of the Impact Assessment Data

- 8.59 It should be noted that the sample data utilised within this impact assessment was conducted independently by each RFF housing association partner. In some cases, data varied in methodology to other partners in order to obtain GHG emissions prior to and post intervention.
- 8.60 Given that only a sample of data was provided for each scheme, any Value for Money and cost effectiveness conclusions drawn from this data must be taken indicatively. Table 8.7 shows the margin of error ranges at a 90% confidence interval within each scheme for calculating Value for Money and cost effectiveness. As shown, the overall margin of error for the project overall was $\pm 5\%$.

RFF scheme	Sample size	Population Size (Total number of houses reached in the intervention)	Confidence Interval (90%)
OVH – Oxford House	54	90	$\pm 11\%$
Torus– Underfloor	8	40	$\pm 27\%$
Torus– Innovation Heating	4	36	N/A
Torus – Cherry Lane EWI	52	54	$\pm 4.5\%$
Torus – Beechwood Gardens EWI	32	36	$\pm 9\%$
Torus – Elms House EWI	73	107	$\pm 9\%$
Magenta - Bromborough	25	82	$\pm 16\%$
Total	248	445	$\pm 5\%$

Source: Sefton Metropolitan Borough Council, 2023.

9. Conclusions and Lessons

- 9.1 This Chapter provides a summary of the conclusions which can be drawn from the evaluation, which are framed around each of the five Summative Assessment themes, and the lessons learned from project delivery for SMBC, as well as for policy makers and those designing and implementing similar programmes in the future.

Conclusions

Project Relevance and Consistency

- Appropriately designed to meet its objectives:** the projects core objectives aligned directly to those set out under the ERDF Operational Programme Priority Axis 4c: ‘Supporting energy efficiency, smart energy management and renewable energy use in public infrastructure, including in public buildings, and in the housing sector’. Specifically, the project delivered against PA4.3: ‘Increasing energy efficiency in homes and public buildings, including through the implementation of low carbon technologies’. The (phase 1) project aimed to support 505 households with improved energy consumption through installation of energy efficient measures and delivering a behavioural change programme, and to ultimately to achieve an estimated annual decrease in greenhouse gases of 222 tonnes of CO₂ equivalent. Through these activities and outputs, the project aimed to reduce the number of households living in fuel poverty, provide healthy environments that reduce effects of health conditions exacerbated by cold living conditions. The objectives are considered SMART (Specific, Measurable, Achievable, and Time-bound) and sensible.
- Sound market failure rationale:** the project was designed to address core market failures affecting the market for innovative retrofit measures, which in the absence of public intervention, results in sub-optimal investment. The rationale for the project was predominantly based on the existence of information failures, positive externalities, split incentives, market power, economies of scale and coordination failure. Overall, the rationale for the project appears to be well-conceived and is clearly evidenced through market failure arguments.
- Output targets and financial profile considered realistic, but timescales were challenging:** The project design included achievable output targets and an appropriate financial profile for the works, however the project timescales may have not fully accounted for potential delays that can occur in capital projects/retrofit projects for residential schemes. Elements of risk regarding engagement from tenants, potential issues with the buildings, weather-dependent installation of retrofit measures should be considered within the project timescales and assessment of risks.
- The project remains relevant in light of changing context:** The project aligns with the aims and commitments outlined in several policy documents released since the project launched, and the emphasis on the need for retrofit activity and future investment in similar schemes has become a national priority whilst the scheme has been delivered. This suggests the rationale for a project supporting retrofit measures to improve energy efficiency has strengthened.

Progress Against Contractual Targets

- Three project change requests have been submitted:** allowing a reprofile of the budget and extending project completion dates. The first project change request agreed in September 2019 adjusted the project timescales due to some initial delays, implemented changes required for some of the specific RFF schemes (e.g. an increase in the GHG emissions target following final EPC estimates) and added LJMU as a delivery partner. A second project change request was submitted in November 2020, which requested a

change in the timescales for project delivery and a financial reprofiling of the project, due to the implications of the Covid-19 pandemic on project delivery. A third PCR was submitted in October 2021, the PCR did not require any additional capital or revenue, however, the proposed expenditure was updated to reflect claims data and also to include defrayal in the final quarter for the remaining scheme and the summative assessment/verification of outputs. The changes approved should allow sufficient time for the project to achieve and report on project outputs and to claim the remaining eligible defrayed RFF project costs. The phase 2 project closed early without any capital works being delivered or claimed.

- **Met all output targets:** SMBC provided data that suggests that the carbon savings for phase 1 have exceeded targets and the number of households with improved energy consumption was below the target but was within the 15% threshold.
- **Slight underspend but within threshold:** There was a slight underspend due to the innovative underfloor heating scheme and the external wall insulation scheme not fully achieving their targets (due to Covid-19 related access issues and issues with moisture preventing installation for the external wall insulations scheme, outlined further in Section 6 of this report), but the final expenditure is within its threshold of less than 15% variance.
- **The project has made progress in supporting the horizontal principles:** The project is expected to deliver positive environmental impacts through project delivery supporting an increase in the number of energy efficient homes, increase awareness of energy efficiency measures, associated behavioural change and reducing GHG emissions. Sefton provided several other examples of how the project has contributed to the sustainable development theme, e.g. through seeking ways to minimise paper in the process of reporting and through the delivery partners having sustainability indicators that they are expected to meet. The project supports the equal opportunities and non-discrimination theme through several measures, such as ensuring the recruitment of all staff for the Grant Recipient is compliant with Sefton MBC's Equality and Diversity policies and procedures and selecting properties for the project based on archetype relevance and thermal efficiency need rather than the gender, disability, race, belief, age or sexual orientation of the resident. Further examples of contributions towards the horizontal principles are provided within Section 5 of this report.

Delivery and Management Performance

- **Project management and governance felt to be a key strength of the project:** many of the housing associations commented on the strong management and governance of the scheme. Delivery partner meetings took place regularly to discuss any issues and SMBC provided guidance where required. The project also faced significant challenges (especially Covid-19) which were navigated effectively in terms of management and governance.
- **RFF has faced several setbacks which have caused delays but have been effective at addressing these at the earliest opportunity:** Covid-19 has caused significant delays in the delivery of the project due to: restricted operations of delivery partners to essential works for an extensive period, residents being reluctant to allow access to properties due to risk of Covid-19, social distancing and other restrictive measures in place on site, staff absences due to Covid-19. Engagement with the Managing Authority regarding the pandemic was undertaken in March 2020 at the earliest opportunity and the project

management team attempted to mitigate the risks as soon as possible. The UK's exit from the EU has also caused some supply chain delays for the project. The delays with the supply chain compounded by Covid-19 delays meant that contractors were not willing to enter into time limited contracts.

- **High levels of staff turnover has delayed progress and affected communication:** There were significant changes in key delivery staff over the course of the project with a number of project managers leaving their organisations during the project. For instance, the OVH project manager left the organisation in March 2020. To mitigate against the impacts of staff departures, RFF sought to recruit experienced staff to replace those that had left as quickly as possible or to expand the role of existing staff working on the project where more feasible. The lack of detailed handovers between leaving staff and new staff has led to a lack of knowledge
- **Targeting those most in need of intervention:** data driven processes were used to select properties that had a strong need for intervention. This involved a data based assessment of the housing stock by HAs in order to deliver RFF at properties in need of intervention.
- **Engaging with residents:** Maintaining direct contact with residents was challenging during the Covid-19 lockdowns and resident engagement was limited during these periods, especially when the restrictions were most strict. However, during the majority of the project residents were informed and engaged when required. For example, Magenta had a resident liaison officer who was able to engage with residents. Many residents had concerns relating to access due to Covid-19 and the risk of infection and therefore the levels of engagement were increased to engage with residents who had concerns.
- **Wider engagement activities have been effective in sharing experiences and lessons:** A dedicated website was set up to provide information about the project and details about completions. Project management staff have ensured a presence at a range of local events to provide information to a range of stakeholders (such as local authority representatives, a local newspaper etc.). The project management team have also been key-note speakers for housing association retrofit events, where they have provided a project overview and discussed lessons learnt from the ERDF project, to feed into the design and development of subsequent projects of a similar nature. The North West Hub has also used the RFF project as one its examples of a successful delivery project in the recent COP26 events.

Outcomes and Impacts

- **Improved Energy Efficiency:** A core target outcome of RFF was to deliver a target of 505 households benefiting from improved energy consumption. Although RFF delivered less than its target number of households with improved energy consumption classification (by 12%) it still fell within the threshold of 15% variance from the delivery target set by ERDF guidance and therefore has achieved its energy efficiency objective. The schemes improved efficiency across households, as mean SAP ratings increased from 68 to 76.
- **Reduced greenhouse gas emissions and the associated social welfare benefit:** Another core outcome target of RFF was to deliver a target of 222 tonnes of greenhouse emissions abatement per annum. This is measured using CO₂e which covers a wide range of GHG that have an impact on climate change. It is estimated RFF delivered more than its delivery target (delivered a 356 tonnes GHG emissions reduction compared to target of

222 tonnes or +161% above target) set by ERDF and therefore has achieved its energy efficiency objective. The social welfare benefit associated with GHG reduction brought about by the RFF project is estimated to be in the region of £0.63m.

- **Educating residents:** it is important that residents know how to use their updated technology in order to optimize their outcomes. Part of the RFF project included a behavioral change element, which involved providing residents with information and advising on how to optimise the use of the new technology.
- **Fuel poverty alleviation:** Fuel poverty has become an increasingly prevalent issue over the course of the project and evidence would suggest that the project has helped to reduce resident spending on fuel bills compared to if the project had not taken place however in the context of major increases in energy fuel bills across the country fuel poverty remains a key issue in which a project such as RFF can only influence to a certain extent. The scale to which RFF will continue to alleviate fuel poverty in the future is highly uncertain.
- **Increased resident comfort and well-being (including potential reductions in health conditions exacerbated by cold living conditions):** Survey responses indicated that more residents have not experienced improved levels of comfort/warmth as a result of the RFF energy efficiency improvements and survey responses also indicated that residents generally felt they are no less at risk of poor health due to the RFF energy efficiency improvements. However these results should be treated with an element of caution and it should be noted that results are likely to vary by scheme.
- **Improvements in the aesthetic of the affected housing stock:** Based on the survey results and consultations undertaken with delivery partners and SMBC it can be concluded that where RFF measures have impacted aesthetics, the RFF measures have generally brought about improvements to the properties where changes to the appearances of the home were made.

Cost Effectiveness and Value for Money

- **The project is not expected to generate a strong return on investment but has achieved wider non-monetisable benefits:** it is currently estimated that the £2.25m ERDF investment in the RFF project will support a net additional lifetime economic return on investment of £0.28 net additional GVA for every £1 invested and a cost per house intervened of just over £5,000. Although the above result presents a low return on investment, it should be noted that this is a conservative estimate as this benefit does not account for the significant wider benefits set out above that cannot be easily monetised in a robust way. Survey results imply that wider benefits such as fuel poverty alleviation and an improved aesthetic of the LCR housing stock have been achieved, with 15% of survey respondents noting a reduction in their spending on energy relative to their income despite the energy fuel crisis, and 63% stating that they felt the RFF project has resulted in an improved appearance to their home.

Lessons Learnt

Responding to Market Need and Policy Aspirations

- 9.2 RFF provided a clear market failure argument and rationale for public investment. The project was designed to address core market failures affecting the market for innovative retrofit measures, which in the absence of public intervention, results in sub-optimal investment.
- 9.3 The project continues to align with the aims and commitments outlined in several policy documents released since the project launched, and the emphasis on the need for retrofit activity and future investment in similar schemes has become a national priority whilst the scheme has been delivered. This suggests the rationale for a project supporting retrofit measures to improve energy efficiency has strengthened.

Lesson 1: Importance of reviewing relevance and consistency to ensure project design continues to align with policy aspirations.

Undertaking a Thorough Assessment of Risks at the Design Stage

- 9.4 While the project management team have been effective at addressing issues that have arisen at the earliest opportunity, there could have been more focus within the project design on understanding potential risks that often arise in this type of project.
- 9.5 The project could have carried out a more detailed review at the design and planning stages of issues that might arise with the buildings and carried out pre-site surveys earlier on to mitigate against potential unforeseen elements and allowed additional time within the project timescales to account for typical delays that arise with capital projects of this nature. For example, the project could have anticipated that the underfloor heating scheme could encounter delays due to the risk of moisture in voids preventing works being carried out and profiled this for delivery within dryer summer months to mitigate this risk. The project could have also better anticipated the risks regarding engagement from tenants, and how the implications of this could be mitigated.

Lesson 2: The importance of carrying out a thorough assessment of risks at the early stage of project design and ensuring the project is well designed to mitigate against any potential risks identified.

Ensuring Effective Handovers ahead of Staff Departures

- 9.6 Projects such as RFF are complex long-term projects and inevitably face risks associated with staff change in the accountable body/grant recipient and delivery partners.
- 9.7 Whilst the RFF Management Team developed strong relationship with partners, at times there were some challenges in communication due to the high level of staff turnover and the lack of adequate handovers. When staff members change later on in delivery, this can result in new members of staff being less invested in the project than those that have seen it progress from the outset. This was highlighted as particularly being an issue with OVH, where there was not an adequate handover following the departure of the project manager within the organisation, which contributed towards a breakdown in communication.

- 9.8 Ensuring a more substantial handover between departing staff and new staff can also ensure more familiarisation with the project context, progress to date and challenges encountered.

Lesson 3: Ensuring adequate handovers are carried out ahead of staff departures and new staff members are briefed on the project context, progress, challenges encountered to date and the levels of communication expected for the project.

Undertaking Pre-Site Surveys

- 9.9 With regards to the innovative underfloor heating, RFF has not achieved its target outputs. This is partly due to the issue referred to above, where moisture in the voids prevented works being carried out, and due to some residents not allowing access to their properties for installation, due to concerns around Covid-19. However another issue was that the delivery partners relied on information within EPCs for selection of which properties to target with this intervention. Undertaking pre-site surveys would help to identify early any issues that may prevent installation.
- 9.10 It was found that in many cases, the EPC contained incorrect information, as they often stated that a property had suspended floors (which would be more suitable for underfloor heating installation), but upon entry, they discovered that the properties had solid floors which are not suitable for this type of intervention (it was noted that this occurs frequently in older properties where suspended floors have been converted to solid floors).

Lesson 4: Pre-site surveys can help to identify any issues that may prevent installation and mitigate against the risk of selecting properties that are less suitable for interventions.

Integrating Best Practice Approaches From Elsewhere

- 9.11 The best practice review undertaken as part of this evaluation considered general best practice guidance from Innovate UK and Carbon Co-op, lessons learnt from the predecessor REECH project and from other retrofit projects and innovative approaches seen elsewhere. Overall, the review presented over 10 different retrofit projects from around the UK that had elements of best practice or key lessons learnt relevant to the RFF project. The review highlighted a number of best practice approaches that could be incorporated into future projects of a similar nature:
- Delivering a whole house scheme, drawing inspiration from the Energiesprong approach would achieve greater carbon emissions reductions.
 - Greater implementation of monitoring sensors would be beneficial to future projects as this provides greater quantity of information which can be factored into the design of new products and choices around the most effective products. The use of innovative monitoring was limited on the RFF project to one high rise building and only a small number of flats within this building.
 - Although this scheme targeted those in need, similar future schemes may wish to also incorporate people in need who are living in private accommodation which would further increase the impacts delivered by the project. It should be noted that the OVH scheme did not discriminate between OVH residents and lease hold tenants.
 - Reduce disturbance to residents further by utilising offsite manufacturing when relevant; the monitoring sensors used in RFF provided no significant disturbance to residents and could be implemented to monitor future retrofit schemes.

Lesson 5: Importance of integrating best practice and lessons learnt into future delivery. This could include delivering a whole house scheme, expanding the implementation of monitoring sensors and implementing them earlier on, incorporating private accommodation as well as housing associations, and utilising offsite manufacturing.

Allowing Flexibility to Respond to Changes

- 9.12 RFF has operated in an unprecedented and challenging economic environment due to the onset of the Covid-19 pandemic and the impacts of the EU exit on supply chains, which could not have been forecast in the original project design. One of the identified strengths in the management and delivery of the project, was the project management team's proactive focus on responding to challenges and adjusting the project as necessary (through submitting PCRs and supporting delivery partners to reprofile delivery at the earliest opportunity to respond to challenges encountered).
- 9.13 The political and socioeconomic context is likely to continue to change throughout the remaining delivery period and RFF will need to maintain focus on continuing to ensure that RFF remains relevant and maintain flexibility to adapt the project where needed.

Lesson 6: Allowing flexibility to adapt the project to ensure it continues to respond to changes.

The Importance of Behavioural Change Activities alongside Installation of Energy Efficiency Measures

- 9.14 Within the resident survey undertaken as part of the evaluation, respondents were asked what energy efficiency improvements they would like to see in future, and it was raised by respondents that better education around how to use new systems would be beneficial. Of the respondents that indicated dissatisfaction with the improvements made, one highlighted that whilst providing more control, the new heaters installed were very complicated to use.
- 9.15 52% of the residents that responded to the survey had noticed a change in the amount of energy they used since the energy efficiency measures had been installed. Around a quarter found that their energy usage had dropped (of which just under a half indicated that it had fallen by more than 20%) whilst another quarter had noticed an increase in their energy usage. This could reflect the rebound effect (ie whereby improvements in energy efficiency can encourage a change in behaviour towards increased use meaning the gains made by the new measures are offset by changes in behaviour, indicating that it is not sufficient to improve technology without supporting behavioural change activities).
- 9.16 It is worth noting that at the stage of the evaluation that the survey was carried out, the behavioural change activities were still in the process of being delivered and may not yet have reached all residents. Responses to several questions within the resident survey point towards the importance of delivering supporting behavioural change activities alongside the installation of innovative measures to improve energy efficiency.

Lesson 7: It is not sufficient to install retrofit measures to improve energy efficiency without also delivering behavioural change activities alongside these improvements. Behavioural change activities can support residents to understand how the new measures work, and to encourage them to alter their behaviour to ensure that the new measures result in energy efficiency gains.

Effective Communication with Residents Throughout the Retrofit Process

- 9.17 Responses to the survey indicate that the level of communication with residents throughout the retrofit process had an influence on overall resident satisfaction. Given the older demographic of residents involved in the retrofit process it was important that communication was accessible and available through a range of sources.
- 9.18 The management of expectations for what retrofit measures will deliver is important where overall outcomes may not be immediately seen or felt and the process of implementing the measures has been disruptive or intrusive.

Lesson 8: Communication with residents throughout the retrofit process is essential to resident satisfaction. This includes the consultation phase, the notice period for the works, day-to-day information regarding the works and follow-up information about the new measures implemented. The choice of contractor is also important where noise and untidiness impacts overall satisfaction with the retrofit measures.

It Can be Challenging to Deliver Innovation through ERDF Funded Projects and Processes

- 9.19 The ERDF requirement for an innovative aspect of these energy efficiency treatments to social housing was challenging to meet.

Lesson 9: Innovation is an important consideration going forward for all parties involved in the design process of schemes similar to RFF and the funding systems they operate in. There is a continuing need for social landlords to implement energy efficiency treatments if this sector is to make a major contribution to reducing climate change. Setting targets for social landlords (as has been done with the 2030 EPC banding targets) and then putting in place appropriate targeted financing mechanisms (where the cost of measures can't be recouped by the landlords through reduced bills) should be one of the main mechanisms for achieving this. Implementing these treatments at scale may help to reduce costs and to innovate.

The UK Government needs to consider if future economic development programmes, like the future Shared Prosperity Fund, are an appropriate mechanism for this type of energy efficiency investment targeted at social housing. The absence of the scope now to match EU with UK resources may mean that there are better funding and delivery mechanisms than through mainstream economic development programmes.

There is the related consideration of whether ED programmes are a suitable mechanism for more innovative actions. The experience of the RRF project is that the innovative elements have been more challenging to both fund and deliver, which appears to be a common emerging message across similar ERDF funded projects. Phase 3 of the national evaluation will be considering this issue.

Disseminating Lessons Learnt

- 9.20 Given the increased focus in national and local policy on the need for retrofit activity, and the significant investment committed to similar upcoming schemes, it is important for existing schemes such as RFF to act as a demonstrator project, through sharing details about the extent to which the innovations implemented as part of the project have been successful in delivering

desired outcomes/impacts such as reduced fuel poverty, supporting households to improve energy consumption and GHG emissions abatement, lessons learnt and insights into what has worked well.

- 9.21 Project management staff have begun to raise awareness of retrofit schemes and discuss lessons learnt through ensuring a presence at a range of local events and through being key-note speakers for housing association retrofit events, to feed into the design and development of subsequent projects of a similar nature. The North West Hub has also used the RFF project as one its examples of a successful delivery project in the recent COP26 events.
- 9.22 The project management team procured marketing materials to use for promoting the scheme and engaging with residents, but in addition to sharing these with residents, various advocacy organisations, delivery partners and wider stakeholders (e.g. other housing associations not currently involved in the project) have also made use of these materials for affordable warmth events.
- 9.23 RFF is planning to hold a dissemination event following the completion of the project to provide a summary of the delivery, lessons learnt and impacts the project has had. The event will be held virtually on the 17th of April 2023 as part of LCRCA Retrofit Board and delivery partners and stakeholders will attend the event.

Lesson 10: Given the increased focus in national and local policy on the need for retrofit activity, and the significant investment committed to similar upcoming schemes, it is important for existing schemes such as RFF to disseminate lessons learnt and examples of best practice that other grant recipients and policy makers can draw on in designing future schemes.

Appendix A - Best Practice Review (Detailed)

- A.1 The evaluation is supported by a review of best practice guidance and learning from other Retrofit programmes, examples of programmes delivered in the UK and internationally and the wider literature and evidence on what works well.
- A.2 This review aims to explore examples of best practice and the lessons learned in terms of the delivery structure, co-ordination between partners, monitoring, the technology and solutions deployed, methods of installation and means of maximising resident behaviour change and impact. The section also:
- Presents a sample of projects that have a similar focus to RFF to draw out key lessons in terms of delivery approach and technologies deployed and developed. The selection of comparator projects was based on the relevance to RFF and the availability of evaluation or similar evidence.
 - Focuses on the most illuminating examples of best practice and closest comparisons to the LCR context.
 - Reviews the wider evidence on retrofit best practice and emerging developments in retrofit technology and solutions, e.g. from the Welsh Government Nest Energy Efficiency Scheme (a scheme aimed at reducing fuel poverty) and ECO (a national scheme funded through the energy generators), the Accord Sustainable Retrofit and Smart Grid programme in the West Midlands, the Retrofit Wrap project in the Black Country, Retrofit South East and Deep Retrofit Energy Model in Nottingham.
- A.3 The comparative assessment aims to:
- highlight areas of best practice in delivery of retrofitting and behavioral change relating to low carbon solutions
 - explore alternative means of structuring/delivering/promoting retrofitting to clients

Best Practice Approach to Retrofit

- A.4 The LCR RFF scheme reflects many of the areas of best practice found elsewhere including:
- Targeting those most in need of intervention.
 - Undertaking a ‘whole house’ approach which delivers significant energy efficiency gains. A focus on raising EPC ratings as a key outcome is important to delivering on this.
 - Working with the community to deliver social benefits.
 - Strong management and governance of the scheme.
 - Providing good levels of customer service.
 - Educating residents; it is important that residents know how to use their updated technology in order to optimise their outcomes.

A.5 In 2014 Innovate UK produced a Retrofit for the Future best practice guidance document²³. The guide examined 40 homes from the Innovate UK Retrofit for the Future programme (note this is a different scheme to LCRs RFF scheme), stating what went well, what could be improved and what lessons can be learnt. The guide is split into six themes and contains useful information about what worked well and potential lessons for RFF, as shown below in the table below.

Table A.1 Innovate UK Retrofit for the Future Scheme	
Theme	What Works Well / lessons for RFF
Retrofit Planning	<ul style="list-style-type: none"> • performance targets to help unite targets • fabric first (this was the most common approach taken) • following a tailored approach • surveys, flexibility and contingency plans are needed • having an initial meeting at the home and ensuring there is early engagement with residents • installing services for people staying at home during the works • early engagement with suppliers and local planners • manufacture items off site to avoid disturbance(eg modular heating pods and pre-fabricated roofs)
Building fabric	<ul style="list-style-type: none"> • insulation continuity is essential for reducing heat loss • carefully consider party walls, gaps around services into the house, wall and roof junction • attention to detail during construction is absolutely critical • replacing doors and windows at the same time as adding insulation gives them a closer fit • external wall insulation can be continued below the damp proof course in an insulation trench • the thinnest insulation materials can be expensive, so should be used where saving space is most beneficial (eg, narrow corridors, floors) • blown fibre insulation can reach significant depths in lofts; overboarding helps retain usable storage space • daylighting design can overcome any loss of natural light from thick insulation and deeper window reveals.
Indoor air quality	<ul style="list-style-type: none"> • testing for airtightness midway through construction can identify unforeseen airflow paths • a parge coat (a low-cost alternative to repointing) on external walls bonds floor and roof airtightness barriers • most projects used mechanical ventilation with heat recovery (MVHR). Improvements in air quality were reported in some of these homes • the MVHR unit will perform more efficiently when located inside the insulated envelope of the house
Services	<ul style="list-style-type: none"> • consider how all services interact with each other, including lighting

²³https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/669113/Retrofit_for_the_future_-_A_guide_to_making_retrofit_work_-_2014.pdf

	<ul style="list-style-type: none"> • heating and ventilation controls should knit together complex systems and be simple to use • a good daylighting strategy can reduce the need for lighting and heating in the daytime • handovers should be used to ensure people understand how to use new services and technologies. • the ability to control services was a common area for improvement, with issues identified in 11 properties • some residents wanted more control rather than fully automatic systems.
Working on site	<ul style="list-style-type: none"> • coordination works best when a single individual or organisation takes the lead • effective and informed project management and coordination • continued involvement of the design team once on site • briefings to help teams to understand and commit to the retrofit aims • site operatives should watch airtightness tests to see the results of their work • whichever supply chain model is chosen, clear responsibilities and communication are critical • a realistic timetable with a logical sequence of works, well-structured contracts and clear expectations on the supply chain can mitigate delays. • contractors may need support from specialists when using innovative technologies for the first time
Engaging residents	<ul style="list-style-type: none"> • continual engagement with residents during the project • tours of the house while work is under way • if there are delays or additional works, give residents time to reflect and adapt to them • a handover should cover all elements of the retrofit but with particular attention to the different systems and how to use them together as one system • provide user-friendly controls and clear guidance • aftercare visits to make sure people are comfortable and are using systems well • visit again when new residents move in.

Source: <https://ukgbc.s3.eu-west-2.amazonaws.com/wp-content/uploads/2018/10/05151503/Retrofit-for-the-future-A-guide-to-making-retrofit-work-2014.pdf>

A.6 Development of the TrustMark²⁴ and retrofit standards has improved how schemes are delivered, however it is generally recognised that continuous improvements will be required if the social housing dwelling stock is to reduce its carbon footprint in line with government policy objectives and to adequately reduce fuel poverty.

²⁴ TrustMark is a not-for-profit social enterprise and the only Government Endorsed Quality Scheme in the UK covering home improvements in or around the home. TrustMark operates within a Master Licence Agreement issued by the Government's Department for Business, Energy and Industrial Strategy (BEIS).

A.7 More recently, in 2021 Carbon Co-op produced the ‘Retrofit for All Toolkit’ which provided advice on how to centre energy- vulnerable clients in the design of energy efficiency schemes. The toolkit is designed to be used by Local Authorities, Housing Associations, Energy Companies and Charities. It provides an updated view on best practice going forward in light of the Covid-19 pandemic. The toolkit covers:

- **Stage 1: Initial contact and sign up** – best practice for this stage includes:
 - The eligibility criteria should include income level,
 - Community networks and social marketing should be utilised to promote the scheme,
 - Issues should be communicated in layman’s terms,
 - The offer should be communicated in multiple forms and should be presented in varying levels of detail,
 - Ethnicity and language should be considered, and
 - The application process should be straightforward.
- **Stage 2: Survey** – best practice for this stage focuses on:
 - The need to carry out survey work professionally and in a timely manner,
 - Engaging with residents effectively, and
 - Presenting findings clearly.
- **Stage 3: Design** – best practice for this stage includes:
 - The need to plan engagements and events with residents,
 - Considering the communication preferences of residents, and
 - Engaging with residents to understand their preferences around controlling the installed technology.
- **Stage 4: Onsite/Installation** – best practice for this stage focuses on the need to provide:
 - Contact to residents,
 - Good communication,
 - Mitigation of disruption,
 - Consideration of issues such as mental health, and
 - Complete works in an appropriate time.
- **Stage 5: Post-works** – best practice for this stage focuses on:
 - Checkups / support, and
 - Monitoring and evaluation.

A.8 A **fabric first approach** is generally seen as best practice when retrofitting dwellings. The benefits of the Fabric First approach are²⁵:

²⁵ <https://keystonelintels.com/wp-content/uploads/2017/04/Keystone-Fabric-First-Publication.pdf>

- Energy/CO2 /fuel bill savings are applied to all dwellings
- Savings built-in for life of dwelling
- Highly cost-effective
- Increases thermal comfort
- Potential to promote energy conservation
- Minimal ongoing maintenance / replacement costs
- Minimal disruption to retrofit post occupation

A.9 The Retrofit Pattern Book²⁶ allows designers and manufacturers to show their best practice details to others. The aim is to help improve retrofit standards to reduce fuel use, to increase comfort and to benefit health across all property types. Discussion forums are in development that will enable people to discuss the issues that make retrofits complex and come up with the best solutions

Evaluations of other Retrofit Schemes – Best Practices and Lessons Learnt

A.10 As part of the Phase 2 evaluation, the best review draws on best practice, innovations and learning available from projects:

- **REECH** - The predecessor to RFF, the EU-funded REECH project used a public-private partnership to provide renovations that increase a home's energy efficiency. Initially, the project team undertook energy and resource efficiency assessments at businesses within the city region. They piloted the retrofitting scheme by installing energy-efficiency measures at the premises of these businesses. After a period of evaluation and fine-tuning, the measures were implemented at social rental units in the Merseyside and Halton communities. The result was a reduction in CO2 emissions and fuel poverty levels and an increase in residents' overall wellbeing²⁷.
- REECH Initiative installs the following low carbon technologies:
 - External and internal wall insulation
 - Air source ground pumps
 - Gas saver boilers
 - Solar water heating systems
 - Passive and mechanical ventilation
 - LED lighting
 - Triple glazing
 - Voltage optimisers
- REECH has:

²⁶ <https://retrofit.support/#>

²⁷ https://ec.europa.eu/regional_policy/en/projects/united-kingdom/making-the-uks-social-and-low-income-housing-more-energy-efficient

- Retrofitted 4,000 social homes across the city region to make them more energy efficient and reduce fuel poverty for tenants,
- Created 230 local jobs as 40 local firms carried out the work, and
- Meant 18,000 fewer tonnes of carbon were released into the atmosphere.

The evaluation of the REECH project included the following recommendations:

- 1) Work with funders and housing providers to establish how programme procurement can adapt to improve the economic benefit within LCR whilst conforming to legal requirements.
 - 2) Support the work of Steering Group members, REECH partners and Viridis members to enable them to inform Government of the identified need for a consistent national policy environment within which business can make growth decisions and flourish.
 - 3) Actively promote future planned REECH activities and opportunities to the Liverpool City Region Low Carbon Business database
 - 4) Continue to develop and publicise a series of case studies to showcase the work funded through REECH Initiative funding
 - 5) Ensure that the REECH website carries all relevant information to enable business to engage with REECH, and to find new information
 - 6) Continue the review and update the LCR Low Carbon Business database
 - 7) Engage in a renewed period of promotion in order to increase brand awareness amongst potential local supply chain businesses
 - 8) Continue the review of REECH Initiative programme supply chain sub-contractors
 - 9) Work with manufacturers and installers to produce new monitored results for products installed which do not have established field trials such as voltage optimization
 - 10) Continue to concentrate on measures with high carbon reduction and/or high uptake potential
 - 11) Continue to work with the Local Authorities to ensure that REECH is a preferred agent for Green Deal, ECO, RHI and European Union programme funding applications
 - 12) The REECH team should continue to expand its knowledge and skills bases in order to maintain its technical capacity and usefulness
- **Welsh Governments Arbed 1 Programme** – Although this is much larger in scale this programme focused on ‘whole-house’ thinking and tried to work on a community and adopt a street-by-street approach to provide social benefits and to drive down the unit cost of retrofitting. It demonstrates the benefits of clear and consistent policy, public investment to encourage retrofitting. Phase 1 was estimated to raise the EPC rating from F to C, and Phase 2 from E to D.

Lessons to learn from this project include, the need to:

- **Demonstrate a pathway to net zero 2050** - The programme does not demonstrate a pathway to the standard required for net zero 2050, it will be increasingly

important that retrofit schemes align with net zero 2050 policy and demonstrate a path to this policy aim.

- **Share information effectively:** There was a need to reliably share information at all levels to ensure a high level of installation to reduce long term efforts and cost with maintenance.
- **Allow enough planning time:** Additional planning time could have allowed more appropriate solutions to be have been identified.
- **Have access to the required skills:** Lack of experience and available local skills caused problems in implementation, preventing works of a satisfactory standard being delivered. It will be important to develop skills in this field to ensure satisfactory standards are delivered.
- **Manage /plan for time constraints:** The intention of the Arbed programme was to be “whole house” in its approach, but time constraints restricted this to a “blanket approach”.
- **Dartford Housing Retrofit Project** – This involved the Retrofit of ten semi-detached homes in Dartford to a very high standard as part of the ‘Scaling up Retrofit’ project. There were significant benefits, in terms of comfort, bills and CO2 emissions seen by the four households studied in detail, which suggests the project as a whole was successful in delivering good quality retrofits to hard-to-treat properties which delivered real results while maintaining quality and avoiding adverse consequences associated with poorly-fitted retrofits.

Lessons learnt and implications for RFF are:

- **There will be a trade-off between comfort and energy consumption:** The primary research undertaken as part of the evaluation of this scheme highlighted the trade-off between personal comfort and energy consumption. Where one resident may experience large reductions in energy consumption but no change in personal comfort another may experience large increases in personal comfort but no change in energy consumption as a result of the scheme. Getting the balance right with regard to this trade is important to the outcomes of retrofit schemes.
- **Must ensure residents can use the technology effectively:** The occupants were not familiar with the use of TRV controls and did not use them to adjust the rooms to different desired temperatures, and had on occasions opened windows to cool down the room, instead of turning the heating off. If more training is given to the occupants on using the heating system controls, there may be opportunity to further reduce the energy consumption. More follow up training may be required with RFF to prevent comparative behaviours that are based on lack of information and education.
- **Nest - a scheme aimed at reducing fuel poverty²⁸**
 - Nest is the Welsh Government’s demand led scheme designed to tackle fuel poverty in Wales. The scheme offers a package of free home energy improvement measures to households who are in receipt of a means tested benefit and who

²⁸ <https://gov.wales/sites/default/files/statistics-and-research/2019-07/150310-evaluation-nest-energy-efficiency-scheme-summary-en.pdf>

live in a very energy inefficient home, with a SAP rating of F or G. Nest also provides advice on saving energy, money management, fuel tariffs, benefit entitlement checks and referral to alternative schemes to all householders in Wales.

Impact / Strengths

- The management and governance of the scheme were generally praised by all those involved and recognised as strengths of the scheme
- a low level of complaints and high levels of customer satisfaction.
- Just over half of those surveyed who received advice from Nest reported being better able to heat their home whilst this was considerably higher (at 89 per cent) for those who received an installation.
- The most meaningful and widely stated impacts of the scheme have been increased confidence in, and reduced concern about, heating homes as a result of both measures and advice received by households. For some households this extended to health improvements. Whilst some reported benefiting from energy savings, new systems and increased efficiency have enabled others to use heating and hot water where they could not before.
- The benefit to cost ratio was calculated to be 1.29

Lessons learned / Implications

- Interviews with beneficiaries and third parties highlighted some concerns that the application process was not consistently accessible for certain groups (such as those with sight and hearing difficulties or mental health problems)
 - It was suggested that marketing and particularly the targeting of socially excluded groups could be improved.
 - Whilst the scheme reached some households in need, there was a risk that others equally in need, were unable to access the support they needed as they failed to meet all of the qualifying criteria.
 - the application process is not consistently accessible for certain groups, such as those with sight and hearing difficulties, disabilities or mental health problems; while the scheme has reached some households in need, there is a risk that others equally in need have been unable to access the support they need as they do not meet all of the qualifying criteria; while there is widespread support and praise for the aim of the scheme to offer a ‘whole house approach’, the majority of households have received only a single measure; advice provision alone has been less effective than improvements in achieving outcomes relating to fuel poverty; the marketing and targeting of the scheme to socially excluded groups could be improved.
- **ECO2t and ECO3 - a national scheme funded through the energy generators²⁹**
 - The ECO scheme was launched in January 2013 and is administered by Ofgem. It requires obligated energy suppliers to deliver energy efficiency and heating

²⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003872/eco-wave-1-summary-report.pdf

measures. Since the scheme was launched there have been different phases; ECO1, ECO2, ECO2t and ECO3. ECO2t and ECO3 wave 1 evaluation was completed in 2021.

- **Thamesmead RFF Evaluation³⁰**
 - A Post Occupancy Evaluation was undertaken to analyse the energy performance and internal comfort of 55 Wolvercote Road, Thamesmead.
 - Due to technical issues, the utilities data was not complete, and the consumption for part of the months was estimated. The predicted CO₂ emission of the retrofit project was 14 kgCO₂ /m²/year, but 20.8 kgCO₂ /m²/year was actually achieved. This performance gap was mainly due to: construction quality; assumptions made on SAP calculations; and occupant behaviour. It was, however, an impressive result: 2 to 3 times less energy consuming than an average UK house.
- **Retrofit Wrap project³¹**
 - A pioneering whole house wrap project.
 - The apartment block on Darlaston Road has been upgraded through the installation of a whole house wrap of timber framed panels, dramatically improving the insulation and appearance of the property. The upgraded properties will also benefit from the installation of solar photovoltaic panels which along with the extra insulation, will help to reduce electricity bills for the residents.
 - Didn't have to move tenants out as most the work was done outside
 - Used a local house building factory owned by the housing association
- **Retrofit South East³²**
 - Retrofit South East developed a model for low-carbon retrofit of social housing. The refurbishment of 14 homes created a focus for networking, dissemination and transfer of knowledge to construction businesses, professionals and policy-makers. The project tested solutions to a range of identified market failure issues, to stimulate the emerging retrofit market. This in turn will lead to the creation of new high-quality jobs in the region, and support energy efficiency and carbon reduction targets.

Innovation, R&D and leading approaches

- **Energiesprong, Nottingham pilot** - Energiesprong is an innovative approach to deep retrofit pioneered in the Netherlands. It achieves a near net-zero energy property with a performance guarantee for 30 years. Typical interventions include: – A new thermally efficient wall envelope created with prefabricated panels manufactured offsite – PV built into a thermally-insulated roof cassette, also manufactured off-site – Air source or ground source heating – Removal of gas to create an electricity-only property. The Energiesprong approach makes it possible to take a property in one jump to the required

³⁰https://www.researchgate.net/publication/283949339_Post_Occupancy_Evaluation_of_a_Retrofit_for_the_Future_project_55_Wolvercote_Road_Thamesmead

³¹<https://accordgroup.org.uk/news/2021-07-01/retrofit-whole-house-wrap-project-delivers-lower-fuel-bills-for-residents>

³²https://ec.europa.eu/regional_policy/en/projects/best-practices/unitedkingdom/2694

2050 performance. Nottingham City Homes (NCH) and Nottingham City Council (NCC) have recently completed an Energiesprong pilot of ten properties with Melius Homes to explore methods of making their homes 2050 ready. Initial evidence is that the homes are much more comfortable, feel larger because more of the space can be used, and look much better. So far, the tenants are happy. The value of the homes has also increased. Houses were valued at £80k before the retrofit and £100k after retrofitting, with bungalows showing the same 25% increase from a lower starting point. However this approach is very expensive and therefore often cheaper approaches are preferred / more realistic. The retrofitting in Nottingham is generally seen as a successful example of tenant engagement to produce outcomes that considerably improve residents quality of life.

- **Exeter Council** – Like Nottingham, Exeter is also exploring the energiedprong approach on 6 of the city’s 5,000 homes³³. Exeter City Council secured £600,000 government funding for works to be carried out on 120 of its homes across the city. The money comes from the government’s Green Homes initiative, which looks to address fuel poverty by making homes more energy efficient³⁴. The work will make the homes more fuel efficient and also help the Council’s housing stock become carbon neutral by 2030. The retrofit programme sees the whole house refurbished to deliver high energy standards and includes a new heating system, wall and roof insulation, new windows and doors, and photovoltaic roof panels³⁵.
- **University of Salford Green Deal Trail Monitoring Project**- The Green Deal Trial Monitoring Project being carried out on behalf of the Department for Energy and Climate Change (DECC) is investigating the impact of sustainable retrofits on the performance of homes and outcomes for occupants. The University Salford are partnering with the Greater Manchester Low Carbon Hub which works with 10 local authorities and social housing providers in the region:
 - **Combisave** - a device that fits onto a combination boiler and saves water and gas during the heating of domestic hot water. Combisave used the data delivered in this project to ratify the design of the unit and successfully launch it onto the market, achieving sales of 30,000 units in the first year of trading.
 - **Salford Energy House** – In depth monitoring – Saint Gobain Whole House Retrofit. Over a period of three months Saint-Gobain worked closely with Salford University, Leeds Beckett University and Saint-Gobain Recherche on what is believed to be the most in-depth study into whole house retrofit. What attracted Saint-Gobain to the Energy House was the opportunity to work in a facility where climatic conditions could be maintained, varied and repeated and the results accurately monitored, providing the confidence that the results were due to our interventions with no extraneous factors obscuring performance. Saint-Gobain and the project team found that the heating demand of the property was reduced by 63%. Using typical gas costs this represented a saving of almost £350 per year and indicated that a small dwelling could be heated for less than £4 per week. A significant saving of 1.45 tonnes of CO2 per year was also indicated.

³³ <https://exeterobserver.org/2020/01/22/exeter-net-zero-carbon-housing-pilot-project-wonford-chestnut-avenue/>

³⁴ <https://news.exeter.gov.uk/council-secures-major-funding-to-make-homes-more-fuel-efficient/>

³⁵ <https://news.exeter.gov.uk/tackling-the-climate-emergency-in-exeter-with-retrofit-programme/>

A.11 It is important that new technology continues to develop in the field in order to meet the governments net zero target. For example:

- **Salford Energy House** – In depth monitoring – Saint Gobain Whole House Retrofit. Over a period of three months Saint-Gobain worked closely with Salford University, Leeds Beckett University and Saint-Gobain Recherche on what is believed to be the most in-depth study into whole house retrofit. What attracted Saint-Gobain to the Energy House was the opportunity to work in a facility where climatic conditions could be maintained, varied and repeated and the results accurately monitored, providing the confidence that the results were due to our interventions with no extraneous factors obscuring performance. Saint-Gobain and the project team found that the heating demand of the property was reduced by 63%. Using typical gas costs this represented a saving of almost £350 per year and indicated that a small dwelling could be heated for less than £4 per week. A significant saving of 1.45 tonnes of CO₂ per year was also indicated.

Appendix B - Consultees

- B.1 For the Phase 2 report, consultations were undertaken between September 2021 – February 2022 through semi-structured interviews (approximately 1 – 1.5 hours on average with each consultee). A list of relevant consultees was provided by SMBC, which included a variety of management and delivery staff that had been involved in the project, in addition to the project’s contract manager at MHCLG (now DLUHC). Aide memoires were used to help guide the interviews (which were provided to consultees ahead of the consultations where feasible to allow time to reflect on the consultations).
- B.2 The following project stakeholders were consultees as part of the Phase 2 Summative Assessment report:

Name	Company / Organisation	Job Title / Role on Project
Laura Davies	SMBC	Project Officer -Retrofit for the Future ERDF
Neil Carrol	SMBC	Project Manager - Retrofit for the Future ERDF
Tom Poland	OVH	Reinvestment Delivery Manager
Gareth Frankland	Magenta	Project Manager
Stephen Morrissey	Torus	Project Manager
Paul Dickson	LJMU	Project Manager
Barry Gibbs	MHCLG (now DLUHC)	Contract Manager

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