Department for
Energy Security
& Net Zero

Green Home Finance Innovation Fund Evaluation

Process Evaluation Report (Annexes)

February 2023

February 2023

Any enquiries regarding this publication should be sent to us at:
enquiries@beis.gov.uk

Contents

Annex A: Evaluation Plan

Introduction

This report was developed during the scoping phase of the evaluation of the Green Home Finance Innovation Fund, preceding the phase 1 evaluation research. It is included as an annex to the phase 1 evaluation findings report to provide transparency of the evaluation approach. The report sets out the methods and strands of data collection that the study should follow to ensure that it addresses the evaluation questions. The report is structured as follows:

- The rest of **Chapter 1** introduces the study, its purpose, and the progress made to date.
- **Chapter 2** provides an introductory overview of the Green Home Finance Innovation Fund programme, including its rationale, aims and objectives as well as the three projects supported by the Fund. **Chapter 3** presents the programme **Theory of Change** as well as discussion of the key issues and assumptions underpinning it and other external factors which may contribute towards intended impacts.
- **Chapter 4** provides a description of the delivery processes involved in the programme and concludes with a process evaluation framework to assess their effectiveness.
- **Chapter 5** provides an outline for the approach to impact and value for money assessment/economic evaluation.
- **Chapter 6** provides an overview of the different strands of data collection and the analysis of those.

Purpose of the evaluation, its aims and high-level questions

The Department for Energy Security and Net Zero (DESNZ), formerly The Department for Business, Energy and Industrial Strategy (BEIS), appointed Technopolis in collaboration with IFF Research, and EREDA Consultants to conduct a process, impact and economic evaluation of the Green Home Finance Innovation Fund (GHFIF) programme. The Invitation to Tender (ITT) presented four aims of the evaluation:

1. Determine how well the GHFIF programme objectives, as described in the Business Case, have been delivered.
2. Provide evidence to understand the barriers to delivery of benefits the programme failed to overcome and/or things that could have been done better in design and delivery of the programme to deliver benefits going forward.
3. Trace the different innovations that have taken place in the development and piloting of green home finance products and generate evidence on how the design and implementation of financial products influenced the scale and nature of outcomes achieved.
4. Provide evidence of the outcomes and impacts achieved by the programme, to support both benefits reporting and the design of future green finance programmes.

As a result of a preceding scoping study, DESNZ established a series of high-level evaluation questions that the study will need to answer. A full list of sub-questions is included in the ITT and scoping report accompanying the ITT. In summary, the four high-level evaluation questions the evaluation aims to address are:

1. To what extent, and in what ways, have the activities and outputs of the three funded consortia translated into progress through the six outcome pathways and four impact pathways?

2. To what extent, and in what ways, have the outcomes generated by the GHFIF programme translated into wider impacts on the green finance for energy efficiency industry?

3. Has the GHFIF programme and the projects supported been implemented as intended, and was their design and implementation appropriate to achieving the intended objectives?

4. To what extent have the projects and the programme overall demonstrated value for money?

Overview of the evaluation approach

The evaluation takes a mixed-method, theory-based approach; specifically, a Contribution Analysis, using Process Tracing to test the programme's contribution claims, with an economic Value for Money (VfM) analysis alongside this. The evaluation has three main interlinked components:

- **Process evaluation**: to help determine the effectiveness and efficiency of DESNZ's management and delivery processes; and identify any ways in which delivery processes may be improved. At the interim reporting stage, this provided insight on progress with delivery to date, what was working well/not so well in design and delivery of the programme and lessons learned. The process evaluation also aims to provide learning to inform design of future innovation funding programmes.

- **State of the Market Review:** to determine the scope and details of the current offerings of UK lenders for homeowners to invest in energy efficiency of their domestic dwellings. The purpose is to provide information on the current state of the lenders market in the UK in terms of the features of such products. It will provide insights into how the market might be incentivised to offer compelling and attractive investment products with an appropriate balance of risk. The State of the Market Review will involve an online search of existing financial products from a range of small and large UK lenders, supplemented by interviews with green finance sector experts. The review will focus on the listing of mortgage lending institutions as outlined by the UK Finance industry association of lenders.

- **Impact evaluation**: to assess the extent to which GHFIF has met its intended objectives and focusses on the short- and long-term impacts 1) related to policy effects, market transformation and diffusion of green mortgages, 2) related to the ultimate impact on energy consumption, bills, CO_2e emissions and air quality caused by the retrofits funded by the scheme. The former type of impacts will be tackled through contribution analysis and process tracing. The latter type will be addressed by the economic evaluation. Special emphasis in the impact evaluation will also be given to case studies and the overall synthesis and ToC review.

VfM evaluation: The VfM evaluation is part of the impact evaluation and will assess the extent to which government investment in GHFIF represents good value for money. The VfM evaluation will follow the 3Es approach: Economy, Efficiency and Effectiveness. One of the benefits of the 3E approach is that it provides a thorough analysis of how the scheme actually transformed inputs (assessed in the Economy stage) into outputs (Efficiency stage) and eventually into outcomes (Effectiveness stage)

Case studies: While the CA and PT framework help to assess the impact of the programme at the overall level, we recommend using project level case studies to explore specific causal mechanisms. They will also demonstrate how outcomes within each of the projects were realised in what context and for whom the projects worked well.

Consumer research: To understand the role of green finance products in driving energy efficiency/low-carbon heating upgrades amongst homeowners, we will capture homeowner perceptions and experiences through semi-structured qualitative interviews. The customer interview strand consists of 39 interviews with GHFIF products' customers. Initial webinars with the three projects were held in July 2021 to outline the plan and discuss ways of working.

Overall synthesis and Theory of Change (ToC) review: a final stage overall assessment of the contribution made by the programme towards achieving intended impacts, over above external contributing factors, with a revised ToC narrative describing the revised contribution claims.

The evaluation will draw upon data from interviews with multiple stakeholder groups and analysis of secondary data sources. Data collection and analysis will be organised across a series of three main phases:

Phase 1 (June 2021 – October 2021)

- Stakeholder interviews (Process and project progress focus)
- Process Evaluation
- State of the Market Review
- Project Progress Summary until October 2021
- Process Evaluation & Project Progress Report
- Learning workshop

Phase 2 (April 2022 – September 2022) – Output and Outcome Evaluation

- Stakeholder interviews (Output and outcome focus) & Case studies
- Consumer Research
- Update to State of the Market Report
- Testing of VfM Approach
- Phase 2 interim evaluation report
- Learning workshop

Phase 3 (October 2022 – March 2023) – Impact and Value for Money Evaluation

Stakeholder interviews (Impact and VfM focus) & Follow up case studies

- Consumer Research
- Analysis & Impact Evaluation
- Value for Money Evaluation
- Final evaluation report
- Learning workshop

This report's primary purpose is to provide an overarching framework for the upcoming process, impact and economic evaluation. The development of a Theory of Change (ToC) is central to this process, including an updated programme logic chain, which describes the outcomes and impacts that are considered measurable within the evaluation's scope. The ToC section includes a discussion of how the programme is expected to contribute towards intended impacts and outlines some of the key external factors that have the potential to contribute to the realisation of relevant outcomes and impacts.

Drawing on the ToC, a Contribution Analysis and Process Tracing framework (in a supporting Excel file) sets out the specific hypotheses (or contribution claims) that the evaluation will test, and what evidence will be used to help prove or disprove each hypothesis. At this stage, this framework will focus on the progress from activities to outputs and early outcomes and will be updated after the process evaluation. This is to ensure that the evaluation can build on the process evaluation to clearly define which impacts the programme intended to achieve.

GHFIF Programme overview

The section starts by introducing the background, rationale and objectives of the GHFIF programme before outlining the programme's main features and the nature of the projects that have been funded under the scheme.

Background to the programme

The GHFIF was launched in July 2019 to support the development and piloting of green home finance products marketed to consumers to retrofit their houses with energy efficiency measures.[1]

The key to understanding the GHFIF programme is that it followed the Green Deal programme. The Green Deal Programme was a flagship policy for energy efficiency retrofits that ran from 2013 to 2015. It worked by offering loans for energy efficiency improvements to homeowners. The distinctive feature of the loans was that they were attached to the property and not the homeowner, and so they stayed with the property even if the owner moved on. The National Audit Office reported in 2016 that the Green Deal did not achieve value for money. Demand for the loans fell way below the government's expectations and it failed to stimulate private investment in energy efficiency.[2] This experience informed the decision to test a new approach with the GHFIF programme. The GHFIF programme was designed as an open competition providing grants for consortia that would allow lenders to develop their own innovative green finance solutions. It was designed to allow lenders to carry out the necessary internal exploration and learnings to develop the expertise, contacts, and infrastructure necessary to launch, pilot, and evaluate green home finance products and, ultimately, to make these products viable and sustainable without government support.

During the period since the Green Deal was launched in 2013, the requirement to improve the energy efficiency of the UK's existing housing stock has been recognised and reinforced as a key policy goal. The importance of improving energy efficiency in the owner occupier sector has become a particularly central issue. This sector accounts for 63% of homes in the UK and 75% of these are below EPC band C.

The GHFIF programme is designed to support three separate but interlinked policy goals:

- The Clean Growth Strategy sets out an aspiration to upgrade as many homes as possible to EPC C, where cost effective, affordable and practical, by 2035, and for all fuel-poor home to reach energy efficiency Band C by 2030, as far as reasonably practicable.
- The Buildings Mission ambition to at least halve the energy use of new buildings by 2030 and to halve the cost of renovating existing buildings to a similar standard.
- The Green Finance Taskforce recommendation for the financial sector to take a more active approach to stimulating innovation in green finance products and services.

[1] BEIS, Green Home Finance Innovation Fund Competition Guidance Notes, August 2019.
[2] National Audit Office, Green Deal and Energy Company Obligation, HC 607 SESSION 2015-16 14 APRIL 2016.

The programme is funded through the DESNZ Energy Innovation Programme (EIP), under which DESNZ invested £90m in innovation funding to develop new energy efficiency technologies. GHFIF Business Case defined barriers relating to financing the adoption of these technologies by homeowners were recognised as requiring public intervention.[3] In 2021 DESNZ announced the launch of a successor to the EIP, the Net Zero Innovation Portfolio (NZIP) committing £1 billion to accelerate the commercialisation of innovative low-carbon technologies, systems and processes in the power, buildings, and industrial sector.

Rationale of the programme

The focus of the programme is primarily on the need to retrofit existing homes rather than new-build houses.[4] The GHFIF competition is designed to help overcome a number of barriers and market failures that have prevented the development of viable financial products to support energy efficiency retrofits:

- **Knowledge gaps required for development of new green home finance innovation:** Lenders providing debt finance to homeowners traditionally do not have energy efficiency expertise and knowledge about the types of products that households would find appealing. They also have a limited understanding of the types of customers who may be interested in these products. Their prospective partners for development of these types of products are companies in the home energy efficiency supply chain which do not possess finance expertise.
- **Initial development costs of green home finance innovation:** Development costs associated with introduction of non-traditional products are high and include development of new processes, IT infrastructure, and new knowledge and skills. These costs are significant and may often require hiring staff with skillsets different to those associated with more traditional debt finance products.
- **Lack of confidence from homeowners that investing in energy efficiency measures can be easy and desirable:** Previous policies such as the Green Deal have shown that bill savings on their own are not enough to incentivise homeowners to invest in energy efficiency. Homeowners see their homes as both places to live and a financial asset so to become more desirable energy efficiency measures will need to demonstrate that they are adding value.[5]
- **Slow rate of product innovation and acceptance of risk**: The financial sector is more risk averse since the 2008 financial crash. The rate of innovation has been slow, in particular when considering introduction of new products. Lenders have also been slow to understand the link between energy efficiency and lower default rates, or increased value of properties. DESNZ has recognised that finance providers such as mortgage lenders could potentially diversify their products and services to incentivise energy efficiency retrofits without government support. However, intervention is needed to stimulate product development and bring finance products to market faster than in case of no intervention.[6]

[3] GHFIF Business Case.
[4] GHF103 does include new builds.
[5] GHFIF Business Case.
[6] Ibid.

- **Lenders are seen as crucial for prompting consumers to consider energy efficiency upgrades**: DESNZ customer research has shown that people trust lenders to offer advice on energy improvements to their homes.[7]
- **Collaboration and network failures:** The network of relationships between lenders and energy efficiency supply chain companies is currently underdeveloped. These collaborations are required for the introduction of green home finance innovation.

Aims and objectives of the programme

The aim of the competition is to help overcome the market failures and barriers outlined above by supporting the development and piloting of sustainable green home finance innovations (products, services and solutions).

The specific objectives of the GHFIF are[8]:

- For lenders to develop and pilot products with customers by the end of each project.
- For lenders to create new brand value through the development and introduction of new ‘green’ products.
- For lenders to develop relationships with the energy efficiency supply chain (focused on building relationships with energy efficiency service provider organisations and/or large energy efficiency service providers).
- To develop innovative green home finance products that have sustainable business models, that will incentivise energy efficiency retrofit, and which are supported and promoted effectively by the lender.
- For lenders to develop the necessary IT infrastructure to make decisions about energy efficiency investments.
- To establish the evidence base on customer demand for green home finance products, including marketing techniques, profiles of potential “green finance” customers, product design and the likely size and scope of the market.
- To contribute to the evidence base on what works for this type of financial product (exploring enablers and barriers) that can be used by industry actors to inform their product development and by DESNZ to further develop policy on green home finance.
- In July 2019 at the stakeholder information event DESNZ asked that by March 2021 the pilots cover approximately 1,000 loans per product (energy efficiency works were not required to be actually carried out and verified in that period). However, following feedback from stakeholders that this was a feature that would detract from their participation, the target was not included in the Programme Guidance issued in August 2019. The current GHFIF projects are reportedly aiming to sign up between 300 and 1,000 customers, though during the scoping study phase interviews it was not clear whether all projects were aware of these targets. Understanding the nature and evolution of these targets, the way they were communicated and the effect on lender

[7] Ibid.
[8] The objectives are based on the review of programme documentation and the interviews.

sign-up to the programme will be an important question in the process evaluation explored in more detail in section 4).

Summary of the programme and the projects funded

The competition opened in August 2019 and closed in October 2019. In contrast to previous policy developments (in particular the Green Deal described above), the GHFIF programme uses a grant competition model to directly fund the development and piloting of innovative green finance products by finance providers (lenders).

Lenders were encouraged to form partnerships with organisations from the energy efficiency supply chain. The competition is funded from the DESNZ Energy Innovation Programme and started with an initial budget of £4.63 million to be made available to develop between three-to-five projects. The call for proposals generated 12 Expressions of Interest (EoIs) which developed into four full applications. One application did not meet the quality threshold and was therefore unsuccessful.

The three funded projects received a total of £1.8m of public funding. The size of the projects ranged between £965,000 and £1.8 million with DESNZ contribution varying between 25% and 60% of the total project costs. Two of the projects were led by a lender and one by a software development company.

Table 1 GHFIF Projects

Name of project	Project Lead	Project aims	Nature of the product and target market
Add to My Mortgage, GHFIF 101	Home Infrastructure Technology Ltd.	The Add to My Mortgage project aims to create an online platform that allows homeowners to search vetted Green retrofit vendors, and then at the point when they are wanting to proceed with the purchase of the goods and services they can click on an “add to my mortgage” button which will make the link to their existing mortgage with one of the main UK lenders. The vision is that it will be as simple as paying for it on a credit card today.	Developing a software platform that creates Point of Sale Finance for Green Vendors by linking potential customers to their existing mortgage lenders. The target market is existing homeowners and landlords who have a mortgage with a major lender.
Green Home Mortgage, GHFIF 102	Lloyds Banking Group	The aim of the Green Home Mortgage project is to develop an end-to-end customer journey that (a) identifies the most effective energy efficiency home improvements for their given budget through an innovative, interactive customer tool; (b) provides guidance on	Through Halifax, a Green Living Reward of £500 is offered to new or existing mortgage customers who use part of their loan on a Trustmark registered installer to make energy efficiency improvements.

		how to source and get the specific suggested improvements installed; and (c) provides financial incentives to fund the improvements. The idea is that in a single process with a trusted high-street mortgage lender, customers can successfully install effective and cost-efficient measures to improve energy efficiency.	The product is targeted at retrofit of existing homes.
VALUER, GHFIF 103	Monmouthshire Building Society	Following a previous research project called LENDERS, the VALUER project trials a methodology to improve mortgage affordability calculations and develop two products: a 'green' mortgage product that estimates true energy costs and a 'green' further advance product pilot that potentially enables increased borrowing. In addition, new green 'valuation' tools will be developed as part of the project. A 'green' Surveyor Comparator Tool (SCT) with RICS and local estate agents, as well as a 'green' Automated Valuation Tool (AVT) with Rightmove.	Within two 'geofenced' areas in south Wales, new home purchasers will be offered pilot 'green' mortgage products that include assessments of energy efficiency. Covers both new-build and retrofit of existing homes.

GHFIF Theory of Change

This section provides an overall Theory of Change (ToC) for the GHFIF programme. Developing a ToC is a key first step of any evaluation plan, particularly when a theory-based evaluation is suggested. It sets out an agreed understanding of what the programme is expected to achieve and contribute towards, highlighting focus areas for the impact evaluation. The ToC section starts with providing an overall programme-level logic chain, an illustration of how the programme's inputs and activities are expected to translate through to their intended outputs, outcomes and impacts.

There are mixed views expressed in evaluation methods literature on the role of logic chains in developing a 'Theory of Change' (ToC). Some guidance (such as the Rainbow Framework[9]) describe a logic chain itself as providing an overall representation of the programme theory, or theory of change. As noted in the UK government's recently revised Magenta Book (March

[9] Rainbow Framework by the Better Evaluation consortium: https://www.betterevaluation.org/en/rainbow_framework/define/develop_programme_theory

2020)[10], "*the most appropriate tool to use will depend on the characteristics of the intervention, the complexity of the system it is applied to, and the type of evaluation that is being planned*". The ToC provides a framework to identity what outcomes and impacts are within scope for the evaluation and the causal links to be assessed.

As described in Chapter 1, the approach taken to developing, testing and refining a ToC for GHFIF is primarily based upon a Contribution Analysis (CA) approach strengthened by the use of Process Tracing tests to provide an assessment of the strength of the evidence. CA is a theory-based approach designed to reduce uncertainty about the contribution the programme is making to the observed results by taking into account the roles played by other external factors. For example, one intended impact of GHFIF is to stimulate other lenders to develop innovative green finance products. Whilst the outcomes of GHFIF may *contribute towards* this, the product development decisions by external stakeholders will also take into account other factors, outside the scope of the programme. These extremal factors can affect their assessment of whether a new product will be likely to succeed, such as whether or not consumer demand for green finance has increased, or whether further policy signals have been given by government. An examination of contribution claims is necessary to understand why a programme worked, or why it did not work, and whether the underlying theory was sound. Importantly, it will help DESNZ understand to what extent results can be attributed to different aspects of the programme itself and its level of contribution, when other external factors may also influence results.

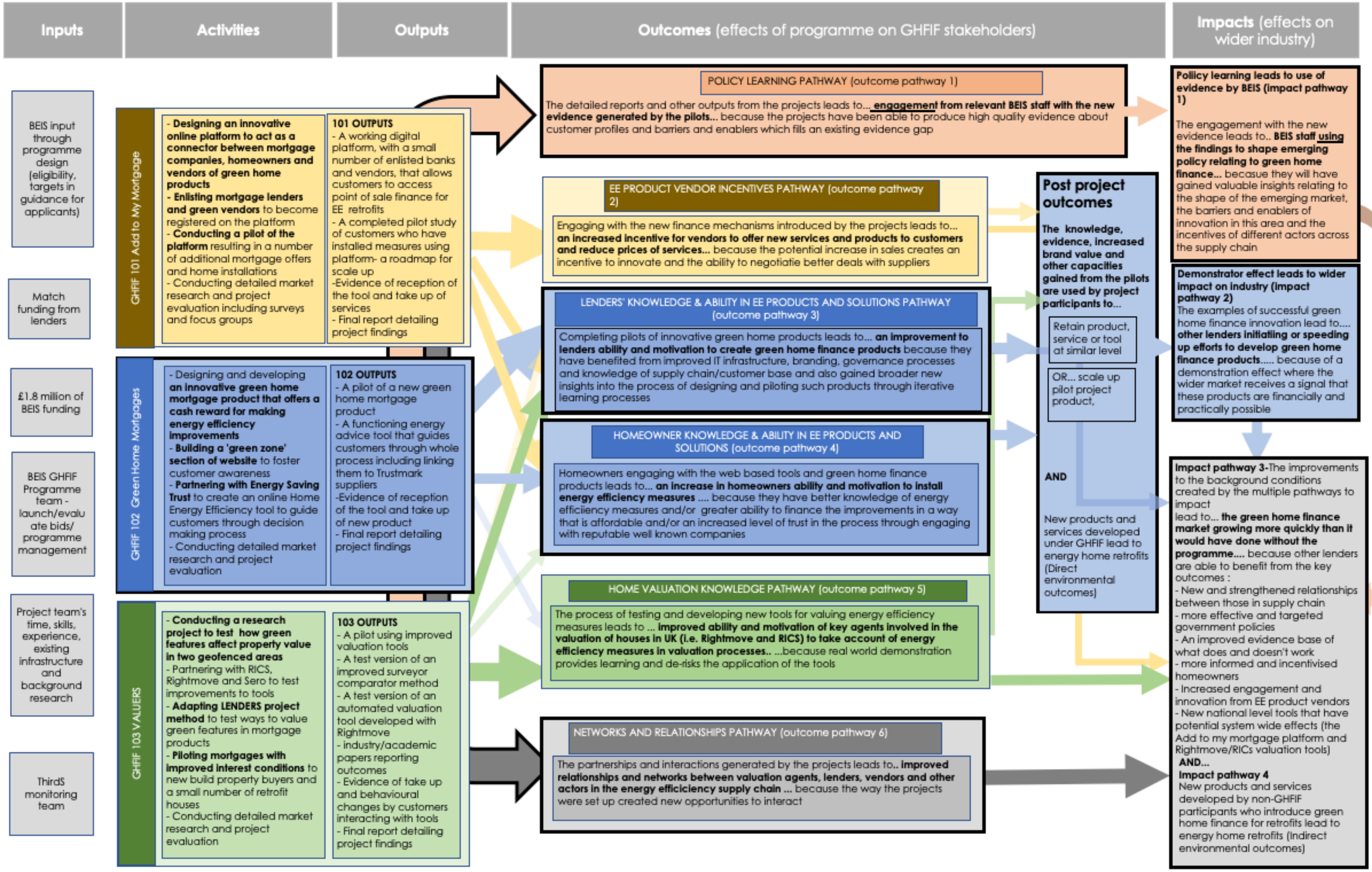
Our approach to the ToC is designed to fit with the CA and also the specific nature of the programme and the projects that have been funded under it. The diagram below provides a logic chain. However, it also demonstrates and differentiates different outcomes and impact pathways within the overall logic chain. The aim is to show that there are six distinct 'outcome' pathways from outputs though to outcomes, to show the distinct ways in which the three different projects that have been funded by the programme contribute to the outcomes of the programme. In addition, we identified four distinct 'impact' pathways to describe how the outcomes influence the final planned impacts of the programme. These outcome and impact pathways will form the basis for the development of the contribution claims that will be tested as part of the impact assessment stage of this evaluation. This is discussed further in chapter 5 of this evaluation plan.

We emphasise that these outcome and impact pathways, and the ToC as a whole, will be rigorously tested and updated as new information comes to light. For example, it may be that an unexpected pathway to stimulating the green home finance market comes to the fore over the next year. In practice this would involve updating the diagram at later points in the evaluation.

Figure 1 summarises the logic chain along with the outcome and impact pathways in the GHFIF programme. The assumptions and key external influences on each stage of the logic chain and each identified key pathway are then outlined in the subsequent narrative.

[10] HM Treasury (2020) *Magenta Book.* Available at https://www.gov.uk/government/publications/the-magenta-book (accessed 12 May 2020).

Figure 1 GHFIF Logic Chain



Source: Technopolis

Note. BEIS is the predecessor of DESNZ.

Note on changes to the ToC since the scoping phase of the evaluation

Since completing the scoping study, we reviewed the ToC and the outcome and impact pathways with our partners at EREDA and IFF Research and concluded that the main outcome/impact pathways developed in consultation with and validated by DESNZ programme and policy leads are well defined. There were nevertheless two small changes that we made to the logic model and the associated ToC. The relevant additions were:

- ‘New products and services developed under GHFIF lead to energy home retrofits (Direct environmental outcomes)’ to the expected Post Project Outcomes,
- ‘New products and services developed by non-GHFIF participants who introduce green home finance for retrofits lead to energy home retrofits (Indirect environmental outcomes)’ to the potential Impacts.

Whilst it is not the main objective of the programme and it would be unreasonable for a programme of this scale to result in substantial direct effects on energy efficiency, any commercialised GHFIF products have the potential to lead to energy improvements in homes of their customers. There may also be a longer-term indirect contribution of green home finance products introduced by other lenders following demonstration effects from the successful introduction of GHFIF.

These amendments were presented to the DESNZ programme team and policy leads during the inception meeting and were viewed as improvements in terms of comprehensiveness of the Outcomes/Impacts of the programme. These types of impacts will be quantified during the impact evaluation so that they can be included in a comprehensive VfM evaluation of the scheme. However, it is emphasised that these direct environmental benefits realised by customers of the green home finance products were never the primary objective of the programme. Rather the signalling of product viability to non-participating lenders and take-up of these products is of greater importance (described in the ToC under Demonstrator effects impact pathway 2). The availability of data for environmental impacts will be carefully considered, and the research design will be tested before dedicating significant effort into exploring second degree impacts.

Beyond these two additions to outcomes and impacts, the ToC narrative has not been significantly amended from how it was presented in the scoping phase of the evaluation. The main amendment has been to update the section on the Green Homes Grant to reflect it being cancelled in March 2021. We have also clarified the distinction between the outcome and impact pathways in the ToC and used consistent terminology to describe them. The State of the Market Review and qualitative research will further improve our understanding of the contextual factors within which GHFIF operates and the external influences and the underlying assumptions of the ToC will be updated following this work.

DESNZ funding for GHFIF

Funding of £4.63 million was made available from within DESNZ to develop between three-five projects. This budget would include project costs for delivery and monitoring and evaluation.[11]

The competition was opened in August 2019 and closed in October 2019. The call for proposals generated 12 Expressions of Interest which developed into four full applications. Three consortia were funded with a total of £1.8m of public funding.

The levels of funding to the projects are restricted by the State Aid rules and are between 25-60% of eligible project costs (depending on organisation type, planned dissemination activities or collaboration uplifts). Funding will be provided to grant recipients on the successful delivery of agreed milestones.

Matched funding by project partners

Project partners invest their own resources to meet the outstanding costs after the DESNZ contribution. The total level of co-funding from the three projects is £2m and the specific contributions are detailed in Table 2 above.

Project team's time, skills and experience

It was expected that the winning projects will bring the appropriate levels of skills and expertise needed. The competition guidance explained that part of the assessment criteria for funding is evidence of track record of delivery and capacity and experience and capability of the proposed project teams.

Research conducted by consortia in preparation for bids

The consortia applying for funding conducted wide-ranging research that feeds directly into and enables the innovative product pilots. For example, the Lloyds Banking Group has conducted quantitative customer research with circa 3,600 customers to develop understanding of customer attitudes and behaviours linked to sustainability.

Preparatory work

Preparatory work has already been completed by the lenders and partners to prepare for the pilots. This includes initial work on IT systems, regulatory checks, baselines, online tool development and relationship building.

Energy Innovation Support Programme (EISP) team resources

The EISP team administering the DESNZ Energy Innovation Programme provided support in terms of the appraising the technical feasibility of applicant's proposals and to monitoring functions to support progress reporting on the project. The monitoring activities involve working with the project delivery teams to identify project progress, meeting project milestones, and provides advice to DESNZ on the drawdown of funds. Monitoring activities reduce the risk of unsuccessful delivery of the demonstrator projects and ensure project deliverables such as the final project report, project learning reports and knowledge dissemination are carried out, where appropriate, in line with the plans set out in the funding application.

[11] GHFIF Business Case.

Activities

The activities below are split into general activities that all the projects are carrying out and then activities specific to each of the projects.

Activities general to all projects

Developing and running a green home finance pilot

All projects are developing an innovative solution with the aim to enable more finances to flow to the green retrofit market. The solutions being developed by the three projects differ, one is a new finance product (GHFIF 102), one a new valuation tool (GHFIF103) and one a platform that will allow lenders to finance home improvements (GHFIF101). Further detail is provided below specific to each activity.

Final scoping and project planning

The first stage of each project involves the grant recipient finalising the project plan and undergoing due diligence, financial and organisational checks required to receive public funds. They also developed a monitoring and evaluation approach and finalised the project milestones. Projects were required to build in project data collection and reporting requirements for all relevant DESNZ Energy Innovation Portfolio KPI Performance Metrics using the DESNZ Project Data Collection and Reporting Template and the Standard Methodology Guidance.

Product development phase

Projects will conduct development work prior to the launch of the pilots. This phase will include market research/consumer profiling/market testing, supply chain development, the development of IT infrastructure to link mortgage decisions to energy efficiency, the development of marketing strategy/routes to market/consumer interfaces, the development of tools/services and internal approval processes, homeowner/supply chain engagement and recruitment, and the development of a technique for verifying the energy efficiency improvements.

Activities specific to each project

GHFIF 101 Add to My Mortgage activities

- HIT will design and create an innovative online platform to act as a connector between mortgage companies, homeowners, and vendors of green home products.

- HIT will enlist mortgage lenders and green vendors to become registered on the platform.

- HIT will conduct a pilot of the platform resulting in a number of additional mortgage offers and home installations.

GHFIF 102 Green Home Mortgage activities

- Lloyds Banking Group will develop and pilot an innovative green home mortgage product that offers a cash reward for making energy efficiency improvements.

- Lloyds Banking Group will develop a new 'green zone' section of website to foster customer awareness.

- Lloyds Banking Group will partner with the Energy Saving Trust to create an online Home Energy Efficiency tool to guide customers through decision making process.

GHFIF 103 VALUER activities

- Project partners will conduct a research project to test how green features affect property value in two geofenced areas.

- Monmouthshire Building Society will partner with the Royal Institute of Chartered Surveyors, Rightmove and Sero Group to test improvements to valuation tools.

- Project partners will adapt LENDERS[12] project method to test ways to value green features in mortgage products.

- Monmouthshire Building Society will pilot mortgages with improved ability to value green features to new build property buyers and a small number of retrofit houses.

Monitoring and reporting

Grant recipients are required to deliver periodic update reports and a final report, to be published, describing the pilot and outlining the lessons learned. Each project is allocated a Monitoring Officer at the start of the funding period. Projects are expected to undertake their own project monitoring with the support of their Monitoring Officer (MO). The reporting includes: a monthly narrative report of progress (available up to June 2020); a quarterly formal progress report including a financial forecast, and update of the project plan and risks, and a final financial and narrative report within 30 days of the end of the project. MOs are responsible for reviewing all reports and address any issues that arise. Any changes to schedules or project plans need to be discussed with DESNZ and applicants are expected to maintain significant interaction with the competition team throughout the project.

Outputs

The outputs below are also split into general outputs that all the projects should produce and then outputs specific to each of the projects.

Generic outputs

Evidence of reception of the tool and take up of new product

All the grant recipients are collecting extensive evidence on how their product and/or tool is being taken up by homeowners.

Final report

At the end of the project grant recipients will be required to produce a final report. This should include the following sections: a breakdown of lender's portfolio by EPC band; a report covering market research and routes to market; details of the green home finance product, including activities undertaken and lessons learned; a green home finance pilot outline,

[12] https://www.ukgbc.org/ukgbc-work/lenders-core-report/

including details of the number of loan agreements made; and an evaluation report covering enablers, barriers and unforeseen consequences. The report should also include a description of the product design and learnings that arise from it.

Outputs specific to projects

GHFIF 101 Add to My Mortgage

- HIT will produce a working digital platform, with a small number of enlisted banks and vendors, that allows customers to access point of sale finance for EE retrofits.
- HIT will produce a completed pilot study of customers who have installed measures using platform.
- HIT will produce a roadmap for scale up.

GHFIF 102 Green Home Mortgage

- Lloyds Banking Group will produce a pilot of a new green home mortgage product.
- Lloyds Banking Group in partnership with the Energy Saving Trust will produce a functioning energy advice tool that guides customers through whole process including linking them to Trustmark suppliers.

GHFIF 103 VALUERS

- Project partners will complete a pilot using improved valuation tools.
- Project partners will produce a test version of an improved surveyor comparator method.
- Monmouthshire Building Society will develop new mortgage products.
- Project partners will produce a test version of an automated valuation tool developed with Rightmove.
- Project partners will produce industry/academic papers reporting their findings and outcomes.

Assumptions on inputs leading to activities

- That the programme budget is sufficient for funding the development of projects that can demonstrate the viability of green home finance products at sufficient scale. There was a risk that the amount and terms of funding and the application process was off-putting to lenders and partners and the project did not receive enough high-quality applications. Some specific aspects of the competition may potentially have deterred bidders, such as the target numbers of consumers in the pilot, which for some lenders could be an onerous task.
- That the application process was sufficiently rigorous to ensure that only technically feasible (specifically, in terms of commercial viability, finance, timings) projects were awarded funding. The assessment process was appropriate to select the most

appropriate pilot projects from the pool of submissions (and by extension, the market as a whole).

- That the funding was necessary to overcome an existing market failure, for example, the projects would not have happened anyway (no deadweight).

Assumptions on activities leading to outputs

- **That competition winners will deliver upon the project plan proposed**. Money is spent as planned and any technical development challenges are overcome.
- **That there will be sufficient buy-in of users and other stakeholders.**
- **That partnerships will function adequately**. The pilots involve novel partnerships between lenders and supply chain companies. There is a risk that the collaborations produce tensions in objectives between the partners and conflicts arise.
- **That the challenges of new processes and infrastructures will be overcome.** The pilots involve the development of new internal processes and infrastructures, in particular relating to the verification of energy efficiency measures. There is a risk that unforeseen complications mean that these barriers become greater than predicted.

External influences

A number of the contextual factors described above could affect the implementation of the pilots and therefore the ability of the projects to successfully complete their pilots and produce their evidence outputs.

Green Homes Grants Scheme

The Green Homes Grant Scheme has come and gone in the period since the beginning of the GHFIF projects. The £2 billion pounds of grant funding provided homeowners with vouchers to help with energy efficiency upgrades. It was announced in July 2020 and was due to run from September 2020 to March 2021. However, in November 2020 it was announced that it would be extended to run until March 2022 to allow more people to benefit. However, it was then cancelled in March 2021 following implementation issues with the scheme.

The Green Homes Grant may have contributed to the success of GHFIF projects by providing a complementary incentive (for example, it can be combined with the Lloyds Banking Group cashback scheme to help homeowners fund the improvements) or marketing the opportunities for green improvements to homes. On the other hand, it may have disincentivised homeowners to take up the GHFIF products in the pilots as a loan can be perceived to be less desirable than a grant (notwithstanding that it can be combined, as with the Lloyds example above). Another way that the Green Homes Grant could have detracted from the GHFIF schemes is that it may have created confusion around the multiple incentive schemes.

The TrustMark certified installers that are necessary for the Green Homes Grant scheme could have been overwhelmed by demand during the pilot period potentially effecting the ability of the GHFIF projects to use these installers (particularly a potential issue for the GHFIF 102). In March 2021 the GHG scheme has been cancelled which is a notable change in the context in which GHFIF operates.

Covid 19 pandemic and associated government measures

Effects of Covid-19 in 2020 and 2021 were felt throughout the economy and were/will be potentially disruptive to GHFIF projects. The disruptions caused by the first UK lockdown in spring 2020 already led to delays for all projects. However, as of spring 2021, revised timetables have been agreed on.

Despite the delays, there is a chance that there will be some positive effect in driving homeowners to be more interested in the programme and willing to take part in the pilots. This could occur if the fact that a lot of people are spending more time at home leads to them becoming more interested in energy efficiency issues.

Tumultuous housing market

Similar to the effects of Covid-19, sharp shifts in the housing market could have a negative effect on homeowner engagement with any pilots. It could also lead to the project participant lenders having to shift capacity within their organisations to deal with any major shocks. A buoyant housing market may have a positive effect on demand for lending products, among which green homes finance products can be used as a differentiator in the market.

Outcome pathways

Following the way that the ToC is structured, the outcomes of GHFIF are described below in the context of six outcome pathways. For each outcome pathway, we will provide a description (the outcome itself is in bold in each description), a list of important assumptions and a list of key external influences that will affect the success of the pathway.

Policy learning pathway (Outcome pathway 1)

Description

The detailed reports and other outputs from all projects will lead to... **engagement from relevant DESNZ staff with the new evidence generated by the pilots**… because the projects will be able to produce high quality evidence about customer profiles and barriers and enablers which fills an existing evidence gap.

The improved evidence base will include: knowledge about customer demand and marketing for green home finance; profiles of potential green home finance customers; increased understanding of appropriate product designs; the likely size and scope of the market; the real-world barriers and challenges of creating this type of product within a range of types of financial institutions; potential avenues for future government intervention.

Assumptions

- That the evidence generated will be of interest to the relevant DESNZ staff and is presented in suitable formats.
- That the evidence generated will be of sufficient quality and will be relevant.

External influences

Major economic shocks such as those caused by EU exit and Covid-19 have the potential to divert government policy priorities. In turn these changes in priorities can have a positive or negative effect on how policy learnings from GHFIF are received and utilised. Pertinence of the learnings will largely depend on the priorities at the time and demand for learning about effectiveness of this type of instrument.

Energy efficiency product vendor incentives pathway (Outcome pathway 2)

Description

Engaging with the new finance mechanisms introduced by the projects will lead to... **an increased incentive for vendors to offer new services and products to customers and reduce prices of services**... because the potential increase in sales creates an incentive to innovate and the ability to negotiate better deals with suppliers.[13]

This is of higher relevance to GHFIF 101 Add to My Mortgage. They are working with many companies that provide products and installations relating to energy efficiency measures. They have received a large amount of interest from both smaller regional companies and large multinationals. They noted that some companies are proposing to offer new services and products in light of the potential increase in sales that the platform may represent. Given that they are aiming for the platform to be a nation- and industry-wide tool, this could be a major pathway to impact for the programme if the platform becomes successful.

Assumptions

- That the potential of the platform will be viewed as high enough that it has the desired effect on energy efficiency vendors.
- That the platform will be attractive to a wide range of types of vendors in terms of size and product/service focus.
- That the vendor supply chain has the capability to take on this additional work and the time to develop new products.

External influences

- The economic effects of the ongoing Covid-19 crisis and the outcome of negotiations with the EU on the future relationship could influence vendor supply chains and economic operating conditions.
- The effects on the vendor supply chain of the increased workload from the largescale Green Homes Grant scheme could reduce their time and ability to engage with other initiatives.
- Ongoing policy reforms, such as the EPC Action Plan and Heat and Building Strategy could provide a positive signal to vendors to invest in the desired types of innovative new products and services linking up with the platform. The ongoing consultation on how lenders could help incentivise EPC improvements is also highly relevant here.

Lenders' knowledge & ability in energy efficiency (EE) products and solutions pathway (Outcome pathway 3)

Description

Completing pilots of innovative green home products leads to… **an improvement to lenders' ability and motivation to create green home finance products** …because they have

[13] NB vendors are defined as those involved in supplying and/or installing the energy efficiency measures.

benefited from improved IT infrastructure, branding, governance processes and knowledge of supply chain/customer base and also gained broader new insights into the process of designing and piloting such products through iterative learning processes. They should have also benefited from an improved understanding of the associated benefits of EE upgrades. For instance, reducing default risks for customers, and the potential for an increased value of properties, all of which can alleviate lending risk, and make green finance offerings more attractive.

GHFIF 102 and GHFIF 103 contribute most to this pathway as they are developing specific green mortgage products and going through governance processes and IT infrastructure development internally. If the projects are perceived as successful then this should send a positive signal both within the banks and increase the motivation to engage with these type of products (the signal will also be sent externally to the market, a point which is picked up further below under the demonstrator effect impact pathway). GHFIF 101 should also contribute through the partner banks adapting processes and learning from their engagement (although they are not expected to develop functioning IT systems for the pilot, and this could be a longer-term outcome).

Assumptions

- That the changes to IT systems and governance systems will be done in a way that is sustainable and enables learning and capacity upgrades. For example, if initial software prototypes require development work and ongoing upgrades, project partners need to be willing to invest in ongoing improvements.
- That the banks will acquire useful knowledge from the projects. If the research is not well conducted and relevant to the bank's needs it could fail to contribute meaningfully to the knowledge base of the banks on this issue.

External influences

- There are some key external influences that could impact on the banks motivation to continue investing in green home finance products and could outweigh the increases in motivation from the projects. Potential decreases in house prices next year could make investments in green home improvements less attractive to lenders however it could be a route to increasing values of mortgages.

Homeowner knowledge & ability in EE products and solutions (Outcome pathway 4)

Description

Homeowners engaging with the web-based tools and green home finance products will lead to... **an increase in homeowners' capability, opportunity and motivation to install energy efficiency measures** .... because they have better knowledge of energy efficiency measures and/or greater ability to finance the improvements in a way that is affordable and/or an increased level of trust in the process through engaging with reputable well-known companies.

The project that has the strongest focus on homeowner knowledge and motivation is GHFIF 102. Lloyds are developing both the advice tool and the new green zone part of their website. The other projects will also have an effect through their engagement with homeowners but are not seeking to change homeowner motivation as a core part of their projects.

Assumptions

- That the lenders will be well placed to influence consumers on energy retrofit and have an interest in doing so.
- That investing in energy efficiency measures can be made straightforward and attractive enough to consumers.

External influences

- The cancelling of the high-profile Green Homes Grant scheme could affect motivations of homeowners to engage with this issue.
- Covid-19 could have positive or negative effects on motivation. It could lead to increased demand for energy efficiency as people spend more time at home. On the other hand, it could make it difficult to implement any energy efficiency measures.
- An economic downturn could have wide ranging effects on ability and motivation.

Home valuation knowledge pathway (Outcome pathway 5)

Description

The process of testing and developing new tools for valuing energy efficiency measures will lead to an ... **improved ability and motivation of key agents involved in the valuation of houses in UK (for example, Rightmove and RICS) to take account of energy efficiency measures in valuation processes**…because real world demonstration provides learning and de-risks the application of the tools.

This pathway primarily relates to GHFIF 103. The project is working with some of the key organisations involved in the process of house valuation in the UK: RICS and Rightmove. If the new tools that are being developed with these organisations are successful and taken forward, they could have a major impact on the industry and help to unlock more green home finance.

Assumptions

That Rightmove and RICS will view the pilot as a success and decide to roll out the changes to the valuation tools nationwide.

That more sophisticated valuation tools will result in greater attention of valuation agents (for example, estate agents) on EE features of homes.

External influences

- Covid-19 could have positive or negative effects on house values which will in turn affect the importance of EE features on house valuation.
- An economic downturn could have wide ranging effects on ability and house prices potentially negating some of the effects of more comprehensive valuation.

Networks and relationships pathway (Outcome pathway 6)

Description

The partnerships and interactions generated by the projects will lead to… **improved relationships and networks between valuation agents, lenders, vendors and other**

actors in the energy efficiency supply chain ... because the way the projects were set up created new opportunities to interact.

These projects will bring together two groups of organisations that do not have a strong history of collaboration: lenders and energy efficiency supply chain companies. These new collaborations will result in relationships and networks being formed that can be taken forward and built on as the green home finance market expands.

Following the successful completion of the GHFIF projects a network of secondary suppliers that worked on one or more projects will emerge (for example, covering software developers, energy consumption data analytics, providers of energy efficiency technologies etc). Suppliers at each stage of the chain will learn lessons and if successful invest further in their products and services to meet the emerging demand.

Assumptions

- The main assumption is that the collaboration will be fruitful and that organisational relationships will be positive. There is also an assumption that these relationships will continue beyond project closure.

External influences

The key point here is: for the relationships to be cemented in the longer term, it will be essential for the collaborations to be beneficial for all parties but also that the GHFIF projects have a collaborative nature which is sufficient to create close enough ties to allow continued collaboration.

Impact pathways

In this ToC impacts are defined as those effects of the programme on wider industry and government as opposed to outcomes which are instead those effects on project participants or those close to the programme (including relevant DESNZ policy teams).

We have identified four impact pathways on wider industry, government and the environment for the programme. Each of them draws in a distinct way on the six outcome pathways identified above. The four impact pathways are identified below and described alongside the key assumptions and external influences that may affect the impacts being achieved. External influences are particularly key; as the effects move further away from the control of project participants and the relevant teams in DESNZ then external conditions increasingly determine whether impacts are realised.

Policy learning (Impact pathway 1)

The engagement with the new evidence will lead to… **DESNZ staff using the findings to shape emerging policy relating to green home finance**... because they will have gained valuable insights relating to the shape of the emerging market, the barriers and enablers of innovation in this area and the incentives of different actors across the supply chain.

The results of the GHFIF competition projects will provide a knowledge base on this new type of financial product and on customer demand. For instance, it will which products work for different types of lenders and consumers. This pathway does not depend on the pilot studies being a success in terms of being profitable and financially sustainable. The pilot studies could be a failure in terms of demonstrating customer uptake but still contribute important learning of what does not work to feed into policy development. For example, evidence of where barriers remain for certain types of lenders or consumers, can provide insight to inform consideration of what additional policy levers may be needed.

The key is that staff move from engaging with the evidence to actually using it to input into the development of further policy.

Assumptions

- That the insights and knowledge will be presented in a way that is usable.
- That the contribution to the evidence base will be of a sufficient scale and representativeness to be useful.
- That DESNZ staff will be motivated to use the evidence.

External influences

- Whether the financial models developed by GHFIF become superseded by other energy efficiency policies that become more attractive or cost-effective routes for homeowners to fund retrofits (such as the Green Home Grants).

Demonstrator effect (Impact pathway 2)

The first step here is an intermediary step between outcomes and impacts, labelled as Post Project Outcomes on the ToC diagram. The three projects will be able to use the **knowledge, evidence, increased brand value and other capacities gained from the pilots** to either scale up the pilot project product, service or tool or at least to retain them at a similar level.

Moving to the Impact column of the ToC diagram, once the financial sustainability of the projects is established then the examples of successful green home finance innovation will lead to... **other lenders initiating or speeding up efforts to develop green home finance products**... because of a demonstration effect where the wider market receives a signal that these products are financially and practically possible.

The wider market will gain an understanding of the GHFIF project outcomes through the dissemination of project findings through relevant forums and through DESNZ sharing non-commercially sensitive information about the projects. All the projects described dissemination plans in their applications for the GHFIF funding. GHFIF 101 stated they would produce a 'White Paper' and keynote presentation covering qualitative and quantitative information on the outcomes of the project. GHFIF 102 describe a very detailed report they will make to DESNZ (though they do not have same focus on wider dissemination in their application). GHFIF 103 have the most extensive dissemination plan including academic papers, conferences, exhibitions, newsletters, social media and press releases.

The demonstration of success will lead to increased confidence that: innovative green home finance can mitigate risk for lenders and generate sustainable profits; these products are desirable, and a viable market exists and that these products drive energy efficiency retrofit works and will result in substantive improvement in Standard Assessment Procedure (SAP) points for participating homeowners.

This impact pathway draws on outcome pathways 2-5 but not on the policy learning outcome pathway 1 or the networks and collaborations outcome pathway 6.

Assumptions

The main assumption here is that the products will be successful and financially sustainable and that they have been sufficiently well-marketed to ensure sufficient uptake and that a clear customer base has been identified and targeted correctly. If instead they are shown to be unsustainable and are discontinued, this could potentially have the opposite effect and act as a warning to other lenders, which may discourage firms from entering this market.

There is also an assumption that the projects will share sufficient information in their dissemination activities to allow other lenders to make a reasoned judgment on the success of the projects. This will rely on it being possible to present the detail of the projects without contravening GDPR and/or any points of commercial sensitivity.

External influences

The external influences here are any factors which may affect the background conditions for mortgage products success in the UK finance system. These factors will be bank-specific factors; market structure factors; and macro-financial factors.

Improvement to background conditions in the green home finance market (Impact pathway 3)

A key point to note with this impact pathway is that it does not depend on the pilot studies being a success in terms of being profitable and financially sustainable. The pilot studies could be a failure in terms of demonstrating customer uptake but still contribute important learning that allows sector stakeholders to learn and make improvements. This impact (alongside impact pathway 4) is depicted as the final impact in the diagram because impact pathways 1 and 2 will feed into it.

The impact is that the…**green home finance market will grow quicker than it would have done without the programme**... because other lenders are able to benefit from the key outcomes from all of the pathways described above including:

- New and strengthened relationships between those in supply chain.
- More effective and targeted government policies.
- An improved evidence based on what does and doesn't work.
- More informed and incentivised homeowners.
- Increased engagement and innovation from EE product vendors.
- New national-level tools that have potential system wide effects (the Add to my mortgage platform and Rightmove/RICs valuation tools).

Assumptions

- That projects will be able to produce sufficiently robust and detailed information and evidence relating to their projects to contribute new learning for the sector.
- Similar to the demonstrator effect pathway above there is also an assumption that the projects will share sufficient information in their dissemination activities to allow other lenders to learn from the GHFIF projects. This will rely on it being possible to present

sufficient detail of the projects without contravening GDPR and/or any points of commercial sensitivity.

- The projects will be suitably diverse and representative to contribute meaningful and widely applicable knowledge. In other words, they are not solely based in niche sectors.
- That the projects will stand out within the growing number of green home finance products being introduced to the market independently of the programme.

External influences

This is an impact that is far away from the direct control of any of the project or programme participants. All of the external influences listed above are likely to have an effect to the overall impact on the industry. The effects of Covid-19, future trade agreements with the EU and any economic downturns could mean that wider industry is focused on these issues and detract from their motivation to engage with green home finance issues and any of the outcomes from GHFIF. On the other hand, the evolving policy situation could have a positive effect if more pressure is put on actors to engage with green home finance or positive signals are sent to the market that this is a growing and important issue. Also relevant is the fact that some lenders are pursuing/have pursed and developed green home finance products independent of the programme. This could have a positive effect, making other lenders particularly interested in comparing their results and lessons with GHFIF. Alternatively, it could mean that the GHFIF programme learnings are considered less relevant in amongst a wide range of fast evolving market.

Increase in the number of home energy efficiency retrofits (Impact pathway 4)

This route relates to the positive impact of the programme on the number of home energy retrofits and the associated positive environmental impacts. This relates firstly and most directly to the new products and services developed under the GHFIF projects (in the Post Project Outcomes box on the ToC diagramme) and secondly to the new products and services developed by non-GHFIF participants who introduce green home finance for retrofits via the demonstrator and improvement to background conditions impact routes.

Assumptions

- In terms of the direct impacts, that the pilot products will be taken up by customers and that the measures will be successfully installed and will have the intended positive energy efficiency effects.
- In terms of the indirect impact on wider industry installation rates, the assumption is that the programme will have the envisaged demonstrator effect in order to encourage others to increase the rate of green home finance products and consequently the rate of successful retrofit works.

External influences

In terms of the indirect impact on wider industry this impact is very far removed from the direct control of the programme actors and depends on all the other steps in the impact pathways above occurring successfully. Therefore, all the relevant external factors effecting lenders decision making will also be relevant here.

Process Evaluation

This section sets out the key issues for the process evaluation to explore and outlines main processes that underpin GHFIF management and delivery. The section concludes with a process evaluation framework presenting key indicators and data sources.

Key issues for process evaluation

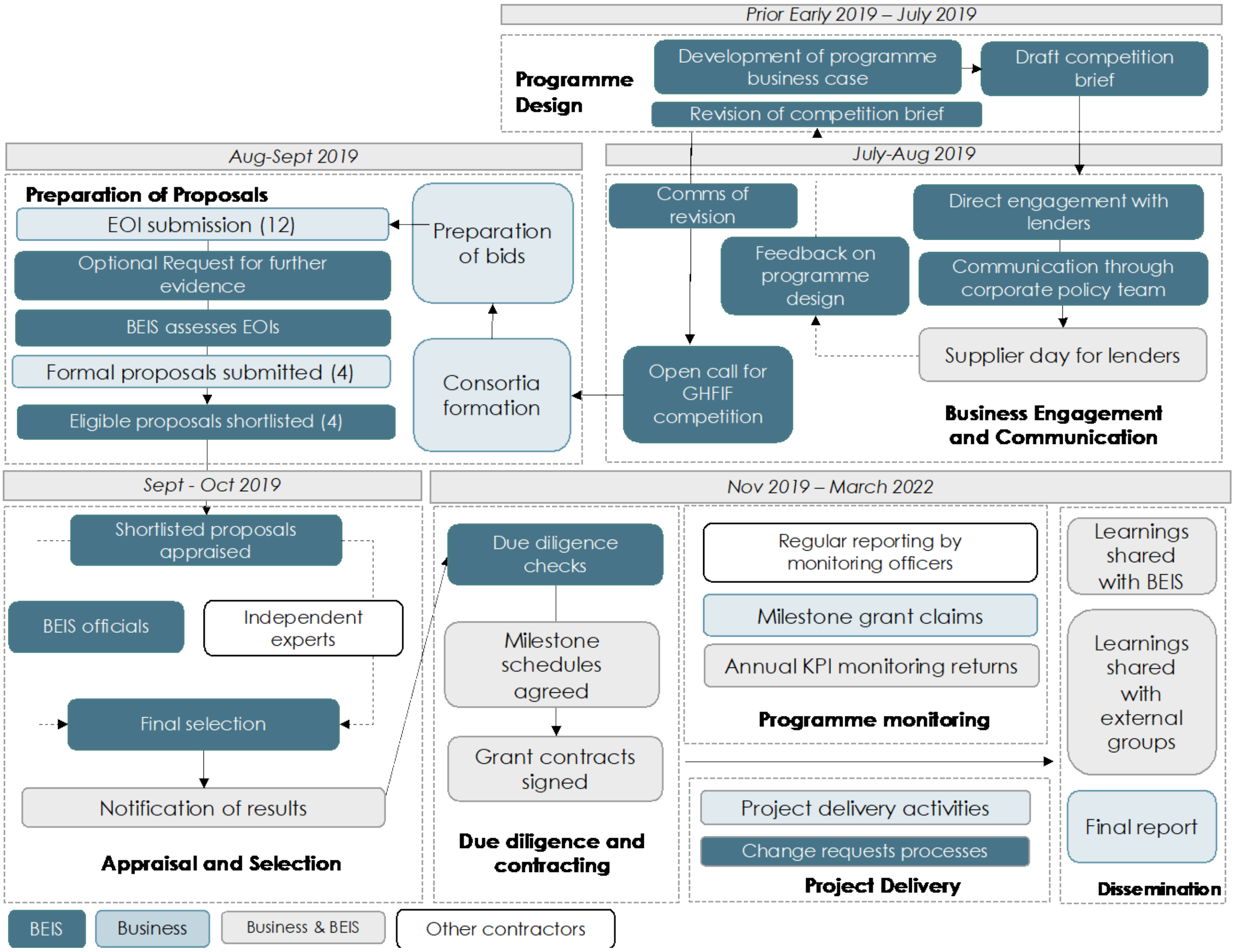
The analysis of the programme incurs a range of assumptions or risks to delivery. This effectiveness of the processes should be linked to the extent to which they are able to contain (or partially contain) these risks. These issues include:

- **Novel intervention:** As noted in Section 1, GHFIF is a programme that was set up to provide direct grant funding for development and roll-out of new debt products to customers. This type of programme is first-of-its-kind and may be considered for future interventions aiming to stimulate development of a new market. As such, it is paramount for the process evaluation to understand how the programme was delivered and put forward relevant lessons learned to feed into future programming.
- **Low application levels:** Despite broad communication of the programme launch and relatively higher levels of interest (12 EOIs received), only four full applications were submitted to the GHFIF, three of which were funded. The process evaluation will therefore need to examine the effectiveness of the early delivery processes (business engagement and communication) to determine whether the reasons for low application levels were due to clarity of information provided, timeframes for submission or other factors not in control of the programme delivery teams. The inception meeting was confirmed by the steering group at this point.

Process map

As outlined in the figure below, GHFIF programme delivery involves six core process stages. These are described further in the section below.

Figure 2 GHFIF programme process map



Source: Technopolis

Business engagement and communication (incl. competition design)

Business engagement and communication activities commenced with a six-week soft launch starting in July 2019. This consisted of discussions with individual lenders, the council of mortgage lenders and the FCA. The call was disseminated through the corporate commercial policy team.

On July 15th 2019, DESNZ policy team organised a supplier day with a broad invitation to different stakeholder groups. These included 45 lenders and a variety of members of the energy efficiency supply chain such as energy suppliers, managing agents and installers and estate agents. During the supplier day, DESNZ collected feedback on competition design which was used for further refinement of eligibility criteria and guidance for applicants.

The formal competition guidance was issued on August 29th. The guidance document contained information on competition objectives and scope, aid intensity and eligibility, expected deliverables application and assessment processes, project plans and finances and monitoring and reporting requirements. The guidance also set out a deadline for EOIs on September 26th and a deadline for full applications 12 working days later on October 14h.

Preparation of proposals

Consortia were formed and the application window was open from August to October 2019.

- EOI stage: 12 EOIs were received on September 26th 2019.
- Full Application stage: Of the EOIs, four applications were developed and submitted by the formal deadline, October 14th 2019.

Applications consisted of detailed project plans which included product development activities, internal Credit Committee approvals, evidence of Homeowner engagement/recruitment, plans for monitoring the impacts of pilot participants and reporting. Applicants were also required to provide a fixed price budget for project activities. The maximum aid intensity (25%) could be increased (up to 60%) dependent on if the applicant is a small enterprise (increase of 20%), if the applicant is a medium-sized enterprise (increase of 10%) or if it matches effective collaboration criteria and extensive dissemination (increase of 15%).

Appraisal and selection of proposals

From October to November 2019, DESNZ officials and independent assessors/sector experts assessed the applications. Eligible proposals were assessed based on the criteria in Table 3.

Table 2: Assessment criteria

Criteria	Weighting
Addressing the competition: credibility of chosen approach, degree of innovation of the proposal, saleability of financial product and quality and credibility of the plan.	45%
Deliverability: appropriateness and credibility of work plan, milestones and deliverables, appropriateness of project management structure and roles and detailed understanding of project risks.	25%
Dissemination: plan to disseminate project learnings.	5%
Skills and expertise: track record of project delivery and capacity and experience of proposed team.	10%
Costs: Details of project costing including justification and leverage of other funding sources.	15%

Each application received scores from three assessors and a moderation panel was used to ensure consistency and to make any necessary adjustments. The panel provided a ranked list to inform recommendations for approval to the project board. DESNZ officials approved the final selection of three applications and notified applicants of the results.

Competition winners and unsuccessful applicants were notified of results at the same time, at which point, unsuccessful applicants were given feedback. The outcome and feedback were communicated through email.

Due diligence and contracting

Following the notification of a successful application, DESNZ began the contracting phase. This included match funding assurances, the signature of a collaboration agreement (if required), the issue of a Grant Offer Letter and a Grant Agreement. The Grant Offer Letter contained information about the grantee's company, any partners, the funding amount and the funded period.

Due diligence checks were carried out, which included match funding confirmation, financial viability checks and undertaking in difficulty tests.

Project delivery

Projects were initially to be delivered over a 16-month period, from November 2019 to March 2021. The delivery consisted of the development of tools and services and internal approval processes. Engagement activities with homeowners and energy efficiency supply chain took places for the trial recruitment processes. The three projects each launched a six-month trial with 1,000 homes which will culminate in final reporting. The three projects established individual milestone schedules. These schedules were revised due to the Covid-19 pandemic, but all three projects are on track to be completed by December 2021.

Programme monitoring

Each project was allocated an externally employed monitoring officer during the notification of their successful applications. Projects had regular meetings on monthly (and in 2021 fortnightly) basis.

In addition, projects were required to submit formal quarterly reports (approximately 25 pages) linked to milestones and key statistics, as well as a final financial and narrative report at the project close.

Projects and their monitoring officers feed into the annual DESNZ Energy Innovation Portfolio KPI data collection. The relevant KPIs for this project include:

- KPI 3 - Number (and size) of Organisations supported to deliver project (Lead Partner and Other Organisations as named on grant offer).
- KPI 4 - Number of active Business Relationships and Collaborations supported (Formal and Informal, Overall and New).
- KPI 5 - Advancement of Low Carbon Solutions - Technology Readiness Levels.
- KPI 6i - Initial Financial Leverage from private sector to deliver project.
- KPI 6ii - Follow-on Funding to take project further forward.
- KPI 7i - A. Reduced Unit Cost of energy- LCOE. B. Potential Reduced Unit Cost up to 2032.
- KPI 7ii - A. Increased Energy Efficiency/ Reduced Energy Demand, B. Potential Increased Energy Efficiency up to 2032.
- KPI 7iii - A. Increased energy system flexibility, B. Potential Increased Energy System Flexibility up to 2032.

- KPI 8 - Number of products (and services) sold in UK and Internationally.
- KPI 9 - Potential reduction in CO_2 emissions savings of project up to 2032.

Dissemination of findings

As part of the application process, applicants were required to detail their plans to disseminate project learnings. The three projects chose different approaches to dissemination and the plans are unique to each consortium.

Table 3: Dissemination activities of GHFIF projects

Project No.	Dissemination Activities
GHFIF 101	White paper with qualitative and quantitative information to allow decision makers to understand the success of the green measures installed during the project as well as a directory of vetted green vendors available for free to homeowners.
GHFIF 102	Detailed report explaining the product's scope, features, project plans and detailed customer journeys, which will look at barriers and enablers for setting up a range of green home finance products. This report will be made available to DESNZ.
GHFIF 103	A variety of events and briefs including newsletters, website, social media, press releases and targeted press releases, thought leadership features, industry and academic papers, conference speaking and exhibitions.

Process evaluation framework

The Invitation to Tender for this evaluation project set out several process evaluation questions to be addressed, including:

- 3.1 Was the design of the competition/the specifications appropriate for attracting the right applicants?
- 3.2 What other issues influenced the application process and the interest of stakeholders in the competition?
- 3.3 Are there any ways in which the processes from appraising applications to contract award and project initiation may be made more effective or efficient?
- 3.4 Were the programme timescales sufficient to allow projects to achieve their objectives?
- 3.5 How did the programme align with other government interventions in this space? To what extent were lenders aware of other interventions and their interactions?

- 3.6 From lenders that did not to participate in GHFIF, what insights can be gained from the evidence to inform consideration of wider policy measures/regulation that may be required to increase their motivation in the future?
- 3.7 Among lenders that did not to participate in GHFIF, what are the remaining barriers to uptake of EE measures?
- 3.8 What insights can be gained from the funded projects relating to the internal product design and processes before and during the launch of products as well as post-launch (e.g. how/when lenders engaged with EE suppliers, what was the necessary sequencing of product design)?
- 3.9 Are there any ways in which processes for providing ongoing project management support, project monitoring, and KPI reporting could be made more effective or efficient?
- 3.10 What insights can be gained from the evidence to inform consideration of wider policy measures/regulation that may be required to increase house EE?
- 3.11 What lessons can be learned relating to lenders motivations, barriers and enablers in developing green finance products?

We have developed a process evaluation framework below that presents the key evaluation questions, metrics, and data sources that will enable an assessment of the processes that GHFIF used.

Questions concerning insights from the delivery of the programme (3.8) are included in the impact evaluation and lessons learned with regards to lenders motivations (3.10, 3.11) are covered by the State of the Market Review and stakeholder interviews. As such, they are be excluded from the process evaluation.

The process evaluation drawing on the following evidence sources. Many of these strands will provide data to inform both the process and impact evaluation.

- **Programme documentation:** there are a variety of different programme documents that will be used to understand how the programme overall and individual work packages operate, as well as helping to assess how well the different processes worked. Sources include work package ITTs, the number of applications received, assessment scoring sheets, the number and profile of attendees at supplier events, monthly and quarterly monitoring reports and final reports.
- **DESNZ programme data:** DESNZ holds a range of programme-level data which will help with the process evaluation. This includes information on the make-up of the Corporate Commercial Policy Team, details about the programme supplier day and call documentation.
- **DESNZ stakeholders:** we will conduct interviews with former and current members of the GHFIF programme delivery team, the DESNZ GHFIF policy team and SICE and EEL SROs.
- **Competition winners:** we will consult senior representatives within the lead project developer firm of winning consortiums to understand the effectiveness of the call and the quality of help and support provided during the project delivery.
- **Unsuccessful applicants:** we will consult staff from organisations who submitted an EOI, but did not participate in the programme, in order to understand any process or

delivery issues (such as insufficient timeframes or feedback on EOIs) that may have deterred the submission of full applications.

- **Mortgage/energy efficiency/green finance market sector experts:** we will consult representatives from industry stakeholders who are not actively involved in the GHFIF programme to better understand how the programme is situated within the wider community (as part of the State of the Market Review), the effectiveness of publicity dissemination and the extent to which the call is relevant in addressing the needs of wider industry.

The table below provides a framework for the process evaluation, setting out each evaluation question to be addressed and the main sources of data collection that will be used.

Analysis of process evaluation data

A large volume of data will be collected to support the process evaluation of the GHFIF programme. Two main approaches will be used to analyse the data collected for the process evaluation:

Descriptive quantitative analysis: this approach will be undertaken to analyse the quantitative monitoring information available, such as the number and quality of EoIs, applications, technical assessment scores, requests for scope change, and so on. Due to the small number of projects, this monitoring information may be limited, and the analysis will be complemented by collection of additional data.

Thematic analysis of qualitative responses: Much of the data collected for the process evaluation will come from the qualitative interviews that are completed. This data will be analysed using a strength of evidence approach and involve identifying the key themes for the process evaluation (identified in the table below) and coding the qualitative responses against these themes.

Table 5 Process evaluation framework

		Secondary Data			Primary Data						
Detailed process evaluation question	KPI/Metric	State of the Market Review	Document Review (incl monitoring reports)	Analysis of Monitoring Information (incl. EIP KPI submissions)	GHFIF programme delivery team (former and current)	DESNZ GHFIF policy team	SICE and EEL SROs	Competition winners (Senior reps within lead project developer firm)	Representatives from each consortium members involved GHFIF projects	Organisations who submitted EOIs but did not participate in the programme	Mortgage/EE/green finance market sector experts
Process area: Business engagement and communication (incl. competition design)											
Sub Question 3.1 Was the design of the competition/the specifications appropriate for attracting the right applicants?											

How effective was the design of the GHFIF competition call in ensuring relevance for green homes finance market?	Number of organisations that attended the supplier day Number of organisations submitting feedback on competition design Changes to the call made on basis of feedback from the supplier day										
Was there a clear communication strategy in place, and when was it established? Was the communication strategy for GHFIF clear about target audiences?	Year, month drafted, year, month revised Quality of considerations in comms strategy										
How effective were marketing and communication activities in raising awareness of the GHFIF amongst the target audiences and motivating applicants to submit applications?	Number of total EOIs submitted										
Did marketing and communications make the objectives of the GHFIF, eligibility criteria, and application process clear to prospective applicants?	Number of ineligible EOIs/applications received Quality of call documentation										
How effectively did GHFIF engage the lender community and representative bodies to raise awareness of the programme?	Perception of competition winners, consortium members, non-winners and market experts/representative bodies										
To what extent were lenders aware of these similar interventions?	Perception of competition winners, consortium members and non-winners										
What similar government interventions exist?	Number and type of similar interventions										

Sub Question 3.5. How did the programme align with other government interventions in this space? To what extent were lenders aware of other interventions and their interactions?											
How have lenders interacted with similar interventions? Why/why not?	Perception of competition winners, consortium members and non-winners										
Sub Question 3.2. What other issues influenced the application process and the interest of stakeholders in the competition?											
What were the reasons for not attending supplier day or engaging with GHFIF communications?	Perceptions of non-attendees and non-applicants										
Process area: Preparation of proposals, assessment and selection											
Sub Question 3.3. Are there any ways in which the processes from appraising applications to contract award and project initiation may be made more effective or efficient?											
Was the EOI assessment effective at identifying projects not eligible for funding?	Number of applications which proceeded to assessment and were found to be ineligible										
Was the time provided for the EOI assessment sufficient? Were the costs incurred in the EOI assessment proportionate?	Perception of competition winners and non-winners										
Was the process of completing an application for GHFIF funding straightforward and proportionate to grants and level of support available?	Share of applicants invited to submit full application doing so										
Was the time between the EOI and full application stage sufficient to develop high quality applications?	Perception of competition winners and non-winners										

Is the feedback provided by DESNZ to unsuccessful applicants useful for understanding the decision and for improving future applications?	Perception of non-winners Timeliness and quality of feedback provided										
What were the reasons for underspend?	Financial documentation Perception of programme delivery team										
Sub Question 3.6. From lenders that did not to participate in GHFIF, what insights can be gained from the evidence to inform consideration of wider policy measures/regulation that may be required to increase their motivation in the future?											
What were the main reasons for not submitting proposals?	Perception of non-winners										
Sub Question 3.7. Among lenders that did not to participate in GHFIF, what are the remaining barriers to uptake of EE measures?											
What do lenders perceive as the barriers to the uptake of EE measures?	Perception of non-winners										
Process area: Programme monitoring											
Sub Question 3.4. Were programme monitoring processes effective for identifying need for revision of project delivery timeframes?											
Were programme monitoring processes effective in identifying needs for revision of project delivery timeframes?	Share of projects requesting change variation and agreeing it with DESNZ Time for approval of change request Perception of competition winners										
Sub Question 3.9. Are there any ways in which processes for providing ongoing project management support, project monitoring, and KPI reporting could be made more effective or efficient?											

Is the breadth of the programme management and project support available sufficient to meet applicants' needs? Are there any gaps?	Perception of competition winners and consortium members											
Does project monitoring provide an adequate framework for understanding the progress of projects towards their objective and enable early identification of any possible issues/threats to delivery and subsequent commercialisation?	Number of cases where issues were identified, Completeness and accuracy of monitoring reports											
Do the MOs have sufficient time, skills, expertise and resources to carry out the monitoring effectively	Perception of programme delivery team (incl. MOs) and competition winners; Review of contractual agreements with EISP (if available)											
Are the costs incurred by grant recipients in complying with monitoring requirements proportionate	Perception of competition winners and consortium members											
Does programme monitoring have effective feedback loops to projects and to programme delivery?	Perception of programme delivery team Perception of competition winners											
How aligned are all the different monitoring processes? Is there any duplication/overlap?	Review of monitoring outputs and perceptions of programme delivery team and competition winners											

Impact Evaluation & Economic Evaluation

Overall approach to testing and refining the Theory of Change (ToC)

Our approach to developing, testing and refining a Theory of Change for the GHFIF will be based around a synthesis of evidence from various strands of evidence using a Contribution Analysis (CA) framework. As outlined by John Mayne (2012) CA:

> *"…is based on the existence of, or more usually, the development of a postulated theory of change for the intervention being examined. The analysis examines and tests this theory against logic and the evidence available from results observed and the various assumptions behind the theory of change and examines other influencing factors [alternative theories]. The analysis either confirms – verifies – the postulated theory of change or suggests revisions in the theory where the reality appears otherwise. The overall aim is to reduce uncertainty about the contribution an intervention is making to observed results through an increased understanding of why results did or did not occur and the roles played by the intervention and other influencing factors".* [14]

In essence, CA aims to draw defendable conclusions on what contribution a programme has made to observed outcomes, over and above alternative explanations. For example, the contribution that GHFIF has made towards stimulating wider industry to invest in further green finance product development, over and above other market signals. This is achieved through an increased understanding of:

- **Why the observed results have occurred (or not)** – for example, why some lenders that are not funded through the GHFIF may have started to explore the green mortgages market.
- **The roles played by the intervention over and above other internal and external factors** – for example, the contribution claim is that government funding for GHFIF sends a signal to lenders, suppliers, and consumers that there will be continued efforts by the government to support the development of green mortgage products for newbuilt properties as well as the greening of the existing building stock. Competitor firms may be stimulated to undertake similar product developments to be ready for an uptake in consumer interest. However, there are pre-existing green finance products (in the UK and internationally) which may also contribution to lenders' decisions to develop

[14] Befani, B. and Mayne, J. (2014) 'Process Tracing and Contribution Analysis: A Combined Approach to Generative Causal Inference for Impact Evaluation', IDS Bulletin 45.6: 17–36.

new products. These external factors may have played more of an influential role than GHFIF.

CA helps to build a credible contribution story. The method is about making a well-reasoned case and drawing a plausible conclusion. This answers questions such as, "*Is it reasonable to conclude that policy X was an important influencing factor in driving change?*".

CA is a useful approach in impact evaluations where experimental or quasi-experimental designs are often not feasible or practical, as is the case with the GHFIF programme. However, there is an interest in assessing whether observed outcomes can confidently be attributed to the intervention. CA is more commonly used to draw qualitative conclusions around the plausibility of attribution, rather than quantifiable levels of impact, such as the effect size of an intervention. However, it may be used to inform assumptions that underpin wider economic evaluation. For example, if we can reasonably demonstrate that green home finance products developed by the GHFIF played a role in stimulating the wider market for emerging green finance products.

CA is an iterative approach to developing, testing and refining theories of change on the contribution to outcomes that a programme has made. The lead proponent of the approach, John Mayne, recommends following a six-step process:

1. **Setting out the attribution problem to be addressed**: as outlined in the ITT for the evaluation, the 'attribution problem' the project seeks to address is the extent to which core intended outcomes (the changes in capability, motivation or behaviour in targeting stakeholders, which in the case of GHFIF includes energy efficiency product vendors, lenders, homeowners, and home valuation agents, amongst others) can be attributed to the programme, or would have happened anyway.
2. **Develop a Theory of Change (ToC)**: outlining the expected steps taken for the programme inputs to meet their intended outcomes and impacts, as well as postulating the role of other potential contributory factors (as shown in Chapter 2, and the accompanying Excel Framework of hypotheses and tests).
3. **Populating the Theory of Change with existing data and evidence:** this involves gathering existing evidence about the ToC and the pathways, with further consideration of the underlying assumptions, risks and other external influencing factors.
4. **Assemble and assess the intervention logic**: emerging evidence from Phase 1 will be used to revisit and revise the contribution claims in the CA Framework. The Phase 1 findings will also help to identify weaknesses in the current contribution stories and what additional data will be needed in the next phases to strengthen them.
5. **Seek out additional evidence**: based on the updated intervention logic Phase 2 will include further interviews with stakeholders to provide new insights on what outcomes each WP achieves by the end of Phase 2, the likelihood that these outcomes lead to future impacts, and the relative

contribution of other external factors. In addition, the State of the Market Review will also be updated to inform our understanding of the potential contribution of external programmes to the impacts. In Phases 2 and 3, the VfM assessment will be conducted which will provide additional evidence on the impact of GHFIF.

6. **Revise and strengthen our understanding of the intervention logic:** stage 3 of the evaluation will provide an overall syntheses phase in 2023, which will triangulate results across all strands of the evaluation to test the programme contribution claims and provide a final narrative on the extent to which GHFIF has met, or is on track to meet, its intended impacts.

Approach to synthesising evidence to assess strength of contribution claims

Whilst the CA approach developed by John Mayne provides a useful overall iterative process to testing and refining contribution claims, it is neutral on the precise methods that may be used to make judgements on the strength of evidence in support of causal claims. It is proposed that Process Tracing methods are used within our overall CA framework, as a means of stating the causal claim test(s) that will be used in the evaluation and to assess the quality of evidence in support of these.

Process Tracing

Process Tracing makes causal inferences by identifying types of ‘clues’ that would either support or reject programme hypotheses if observed. This can be used in combination with Contribution Analysis to develop a series of clues (types of evidence) that would support contribution claims around whether observed outcomes (such as parallel green mortgage products and related services) may be attributable to aspects of GHFIF or other external factors. The approach also allows an evaluator to highlight evidence around which features of the programme have positively influenced results. Process Tracing frameworks provide transparency, in advance of fieldwork, of what criteria will be used to judge whether programme theories hold true or not and how conclusions will be drawn.

There are four types of causal tests commonly used in process tracing that relate to the above detective example: hoop, straw-in-the-wind, smoking gun and double decisive. These tests define the “clues” that we would expect to observe if the hypotheses are true.

The tests are based on the principles of certainty and uniqueness; in other words, whether the tests are necessary and/or sufficient for inferring the evidence. Tests with high uniqueness help to strengthen the confirmatory evidence for a particular hypothesis, by showing that a given piece of evidence was sufficient to confirm it. Tests with high certainty help to rule out alternative explanations by demonstrating that a piece of evidence is necessary for the hypothesis to hold.[15]

[15] Befani, B. and Mayne, J. (2014) ‘Process Tracing and Contribution Analysis: A Combined Approach to Generative Causal Inference for Impact Evaluation’, IDS Bulletin 45.6: 17–36.

A draft CA – Process Tracing (PT) framework will be provided as a separate Excel file. Some illustrative examples of Process Tracing tests are provided below.

- **Hoop tests** – this type of evidence weakens the hypothesis if not found. However, on its own it is not sufficient to confirm the hypothesis either. These are pieces of evidence that we would ‘expect to see’ if the given hypothesis is true. For example, we would expect monitoring reports to show that projects funded by GHFIF have reached a high commercial readiness level (CRL). However, this alone does not provide strong enough evidence that progress can be attributed to GHFIF, as it is plausible these projects may have been developed via alternative sources of funding and support. Although hoop tests may not provide strong evidence to support the theory of change, they are nevertheless an important first step, because if projects hypotheses cannot ‘jump through the hoop’ of demonstrating CRL advancement, then it is highly unlikely that wider positive impacts will be observed.

- **Straw-in-the-wind** – this refers to a type of evidence that lends more support to the hypotheses but is not sufficient in itself to confirm the hypothesis if observed or to reject if not observed. For example, interviews with project leads claiming they would not introduce the mortgage products without the competition would count as ‘straw-in-the-wind’ evidence. This may provide useful insights to explain how and why GHFIF projects were developed. However, evidence based on such ‘straw-in-the-wind’ tests alone may be considered ‘shaky’ given the potential for positive confirmation bias, such as project managers wishing to portray a positive picture to justify their funding.

- **Smoking gun** – this kind of evidence strengthens the hypothesis if observed but does not weaken the hypothesis if not observed. These are pieces of evidence that we would ideally ‘like to see’ if a given hypothesis is true but may in practice be difficult to uncover. For example, if after a successful demonstration of a GHFIF project, the lender firm scales up their capital for the solution and widens the rollout because they see commercial benefits, that would be categorised as a ‘smoking gun’. Given the requirement to submit an evaluation report within a few months of project completion, this outcome may be less feasible to observe within these timescales.

- **Double-decisive** – this type of evidence strengthens the hypothesis if observed and weakens the hypothesis if not observed. These are pieces of evidence that are expected and confirmatory of the hypothesis. An example of double-decisive evidence would be if the lead developer firm shares their internal project documentation, which demonstrates that GHFIF funding was a core part of the business case. Alternatively, another example would be if historic project documentation suggests the project was at an advanced stage of planning and implementation prior to GHFIF, and alternative options to funding were feasible, as this would suggest the GHFIF funding may not have been necessary for the project to achieve its outcomes.

Process Tracing may be combined with Bayesian updating to mathematically estimate the probabilities of hypotheses being true or false based on whether each evidence test has been observed. This involves the specification of prior probabilities for the hypotheses being true according to each evidence test (in advance of fieldwork) and then the updating of these to posterior probabilities based on what evidence is actually observed. This can be well suited to evaluation of programmes based on a relatively small number of cases and evidence tests.

However, in projects with large numbers of interviews and multiple strands of data sources and tests, Bayesian updating may overcomplicate the process given the assigned probability scores for each test are based on subjective judgement. When conclusions on a contribution claim are based on multiple tests across different strands of evidence, the overall scores are more sensitive to errors in judgement of individual tests and risk providing what can seem like arbitrary numbers that are difficult to interpret. Bayesian updating is therefore not appropriate for this evaluation and will not be used.

The approach proposed for synthesising evidence across multiple tests has been informed by the *Evaluation* journal article *Making rigorous causal claims in a real-life context* by Delahais and Toulemonde (2017).[16] Delahais and Toulemonde describe four additional tests for assessing the strength of supporting evidence in theory-based evaluation:

- **An authoritative source** is a piece of evidence which has already passed a thorough test under the responsibility of credible authorities (such as peer reviewed papers) insofar as the point is not in dispute with other authorities. An example would be future published market research reports by the Green Finance Institute showing that GHFIF project leads have gone on to launch green mortgage products and that similar products are emerging among wider commercial lenders.
- **Signature** is when X causes Y, and therefore Y may operate so as to leave a signature (a trace, a fingerprint) that unequivocally points towards to X. For example, if a supplier database was developed as part of GHFIF, the use of this database and its licencing information may leave a signature record in services provided by other lenders.
- **Convergent triangulation** sources are independent from one another insofar as they come from stakeholders who have different vested interests. Pieces of evidence originating from such sources are mutually reinforcing as far as they converge. For example, if interview findings with both project participants and non-participant wider lenders support the claim that green home finance products developed through GHFIF have improved the willingness of lenders to offer these products, in addition to reviews of lender websites which verify their launch, this would demonstrate convergence triangulation of sources.
- **Consistent chronology** is never a sufficient argument for confirming a contribution claim, but it may be used for refuting an assumed contribution.

[16] Thomas Delahais/Jacques Toulemonde (2017) Making rigorous causal claims in a real-life context: Has research contributed to sustainable forest management? In Evaluation, Vol 23, Issue 4, pp. 370 – 388.

> For example, if an interview with a mortgage provider suggests they were influenced to develop a green mortgage product by the emergence of the GHFIF programme, but then public records show the project was already initiated before the GHFIF was announced, then this would refute an assumed contribution.

Our view is that the four strength of evidence tests described by Delahais and Toulemonde should not be considered as replacements for the four PT tests, but certain elements of the former may complement a PT framework to provide an additional filter for drawing conclusions on strength of evidence. As described above, the PT tests were designed to provide a framework of four mutually exclusive categories on a spectrum of how necessary and/or sufficient observing each is for supporting or refuting a hypothesis. The four tests listed above are less mutually exclusive and serve a different, albeit complementary, purpose of considering the strength or reliability of each source of evidence. For example, it is feasible (and likely) that one robust strand of evidence could be both a ‘Signature’ and based upon an ‘Authoritative source’ whilst also being ‘Triangulated’ with other sources.

Overall, it is proposed that the four well-established Process Tracing tests are used as the basis of categorising types of evidence. However, the framework will also take account of ‘Triangulation’ and ‘Authoritative source’ in the rules for assessing strength of evidence in support of a contribution claim. Many of the strands of evidence in the PT framework that rely on interview data are considered to be ‘Straw-in-the-wind’ tests.

All phases of the evaluation include State of the Market Review and semi-structured evaluation interviews with a range of stakeholders and in phases 2 and 3 of the evaluation also interviews with customers of the lenders. Considering whether and why key findings are triangulated and expressed by all groups (as well as secondary data sources) provides another useful filter for considering their reliability in supporting the programme contribution claims. Similarly, considering whether a ‘hoop test’ or ‘straw-in-the-wind test’ finding is based upon an ‘Authoritative source’ (such as peer reviewed publications) provides another factor to consider when making judgements on its likely ‘strength of evidence’.

A draft table of rules for determining the relative strength of evidence in support of each contribution claim in the CA-PT framework is provided below. This should be read in connection with the separate Excel file listing each PT test. The ‘overall syntheses’ will be carried out against each ‘contribution claim’ – which links to each of the key impacts assessed in the ToC.

Table 4. Framework for synthesising evidence across tests to draw conclusions on the overall strength of evidence in support of contribution claim

Strength of evidence in support of contribution claim	Criteria for passing tests
Strong support for programme theory that GHFIF played a significant contribution towards observed outcomes.	IF: all or vast majority of process tracing tests are passed, and the assessment of the evidence is strong in the majority of cases. No hoop tests fail. OR: all smoking gun and double decisive tests are passed in support of programme hypotheses (PH) AND smoking gun and double decisive tests fail for the alternative hypotheses (AH). Some straw-in-the-wind tests in support of PH may fail and pass in favour of AH.
Moderate support for the contribution claim	IF: no hoop tests fail. Evidence in support of some PH smoking gun or double decisive tests may not have been found or are inconclusive. Most straw-in-wind tests pass. Evidence for straw-in-wind test is triangulated with other sources (for example, interviews with different group of manufacturers, investors and sector experts). AND: following criteria above, more PH tests pass than AH tests. Evidence is stronger in favour claim that outcomes were driven by the programme – for example, evidence based on authoritative sources supports PH.
Mixed or weak support	IF: some conflicting evidence in favour of PH – for example, some smoking gun evidence found but hoop tests failed (suggesting ToC itself or the types of tests used need revised). OR: on balance, most evidence tests are in favour of PH, however, these are based on straw-in-the-wind tests, with few based on authoritative sources.
No support for the programme theory OR stronger support for the alternative hypotheses that observed outcomes are primarily driven by other external explanatory factors.	IF: fundamental tests in favour of PH are failed (such as hoop tests). No smoking gun or double decisive tests are passed. OR: evidence in favour of the AH is found that follows criteria for 'Strong support', but not for the PH. this suggests that outcomes are primarily driven by other external factors and not the introduction of the GHFIF programme itself.

The value of this scoring and categorical judgement approach is its simplicity in reporting and its transparency (relative to Bayesian updating). One can easily cross-check these results if a full testing framework is reported in an appendix. In addition, each conclusion on the 'strength of evidence' for each contribution claim will be accompanied by a qualitative narrative and illustrative quotes. This is meant to demonstrate what findings conclusions are based on in a way which is accessible to policy makers.

The draft CA/PT framework (in Excel) outlines the types of evidence required to observe changes in key outcomes described in each of the outcome and impact pathways described above. The analysis of Process Tracing tests will be carried out at a case-by-case level. In other words, each individual interview will be coded to demonstrate whether they provide findings in support of the contribution claim or alternative hypotheses.

A credible ‘contribution story’

To draw conclusions from multiple strands of evidence, the core aim of CA is to make a reasonable and robust case that a program has indeed made a difference. Development of this ‘contribution story’ would entail:

- Providing a well-articulated presentation of the context of the programme and its general aims, along with the strategies it is using to achieve those ends.
- Presenting a plausible program theory leading to the overall aims - the logic of the program has not been disproven. In other words, there is little, or no contradictory evidence and the underlying assumptions appear to remain valid.
- Describing the activities and outputs produced by the program.
- Highlighting the results of the contribution analysis indicating there is an association between what the program delivered, and the outcomes observed.
- Pointing out that the main alternative explanations for the outcomes occurring, such as other related programs or external factors, have been ruled out, or clearly have had only a limited influence.

The final report will provide this ‘contribution story’ narrative and refine the ToC accordingly. This will be used to weigh up evidence to address the following core evaluation questions:

1. To what extent, and in what ways, have the activities and outputs of the three funded consortia translated into progress through the six outcome pathways?

2. To what extent, and in what ways, have the outcomes generated by the GHFIF programme translated into wider impacts on the green finance for energy efficiency industry?

3. Has the GHFIF programme and the projects supported been implemented as intended, and was their design and implementation appropriate to achieving the intended objectives?

4. To what extent have the projects and the programme overall demonstrated value for money?

Question 3 will be primarily addressed through the separate framework described in Chapter 3. For the process evaluation, the aim is to gather insight into what worked well and what can be improved in terms of programme design and delivery processes. The approach will be based on asking fairly open questions and then drawing conclusions that emerge from the ‘bottom-up’ in the data provided. Process evaluation does not require specification of a series of ‘top-down’ hypotheses to test in advance.

Conclusions on the cost-effectiveness of the programme may draw upon evidence generated from the CA-PT analysis. The approach to cost-effectiveness analysis is discussed in the section below on Economic Analysis.

Value for Money Evaluation

This section provides an overview of the approach to the Value for Money (VfM) evaluation of the GHFIF programme. Then remains as proposed and the VfM evaluation will follow the 3Es approach: Economy, Efficiency and Effectiveness. One of the benefits of the 3E approach is that it provides a thorough understanding of how the scheme has transformed inputs (assessed in the Economy stage) into outputs (Efficiency stage) and eventually outcomes (Effectiveness stage).

- **Economy**: in this stage we will focus on the inputs required by the projects funded by GHFIF. This will include an assessment of the quality of the inputs (are they fit for purpose?) as well as the price. Our analysis will ascertain the main price components and drivers of the projects as well as the procedures that were set up to minimise those costs. As an example, input costs from the competition winners can be broken-down along a functional taxonomy into the cost of liaising with DESNZ and FCA, designing and setting up the mortgage product (including regulatory checks), building online tools, training staff, marketing and relationship building. Similarly, one could break down costs in terms of staff, consultants, contractors and materials. When assessing the costs, we will scrutinise whether the inputs are fit for purpose or if a similar outcome could be delivered at lower cost. Inputs into the projects include direct DESNZ funding, matched funding by project leads, project team's time, conducted research, and tools built in preparation for bids. We will make use of programme administration and project implementation costs, including capital costs and additional investments made by the projects and the costs of activities incurred as a result of delivering the GHFIF programme.
- **Efficiency:** in this stage we will focus on the ways inputs are converted into outputs by the projects. This will consider complementarities between the competition winners in terms of existing skills, ownership of the projects and learnings that accrue for both private and the public sector actors. The measurement of efficiency is centred on monitoring the costs and relating them to existing outputs. The scoping study notes that evidence documenting the reception of the online tools and take-up of the products is being collected. It also documents the assumptions related to the transformation of inputs into actions and then into outputs, which are key in the analysis of efficiency. We will use both assumptions and collected evidence to perform an efficiency analysis, complemented with evidence from the CA-PT.
- **Effectiveness:** in this stage, we will focus on the ways that the outputs from the GHFIF achieve the desired outcomes. Analysis will take place along the six pathways indicated in the ToC. The first step in this stage will be to explore the feasibility of setting up measurable metrics for each of the outcomes in the ToC. It will also be important to assess how well outcomes are being delivered and how they are being monitored. Insights from the CA, the case studies, the State of the Market Review and the consumer research will be critical to gain a better understanding of the generated outcomes and of the assumptions influencing each of the six pathways. While the ToC has flagged key assumptions and external influences for each pathway, they will need to be independently validated through this evaluation.

The use of 3E framework will enable us to measure VfM at each stage of the process and gain an understanding of how different stages contribute to the overall VfM, which is particularly valuable in the case of the stand-alone measurement. We will assess cost-effectiveness of the impacts listed in the ToC. The impacts in the ToC will require a translation stage into measurable, quantifiable metrics, in conjunction with attribution insights delivered by CA-PT. Among the data mentioned in the ITT, the percentage of customers who actually made energy efficiency improvements would be particularly valuable.

Our work will benefit from understating the contents of external influences as the members of the evaluation team are leading the Quantitative Economic Analysis (QEA) and VfM analysis of the GHG Vouchers evaluation and the scoping of the GHG cross-cutting impact evaluation. Methodological insights will also be obtained through the work of evaluation team members on the Public Sector Decarbonisation Scheme where they lead the QEA and VfM. Uncertainty related to the VfM will be tackled in Phase 2 when we consider available evidence and test the VfM framework. This will allow any shortcomings in the collected data or understanding of the process to be identified and tackled during the Output and Outcome evaluation, prior to its use in the impact of the VfM evaluation.

6. Data Collection and Analysis (including evaluation timeframe)

This section presents how the evaluation team will collect evidence to support the evaluation of the GHFIF. This includes a high-level approach, considering the themes covered across the different elements of the evaluation, and what data will be needed to answer the process questions (outlined in section 4), and to test the proposed hypothesis for VfM (Section 5) as well as the tools that will be used to compile and analyse the evidence.

Stakeholder Interviews

Multiple groups of stakeholders will be interviewed to meet the different forms of data collection required for the process, impact and VfM evaluation. The same interviews will be used to collect information for each strand, to avoid overburdening the same respondent with multiple requests for interview. However, certain groups will be interviewed in multiple evaluation phases.

We will carry out a programme of stakeholder interviews across the life of the evaluation. Interviews will be semi-structured and carried out through video conferencing where possible (using a mix of either Skype, MS Teams or Webex, according to a respondent's preference). The conversations will be structured around the evaluation questions but tailored to reflect the roles of the stakeholder interviewed. These interviews will last between 30 and 90 minutes, depending on the scope of the discussion and the amount of information interviewees have to contribute. Interviews with people who have insights into delivery processes as well as the impact of the programme will likely be interviewed for a longer period of time. We expect to interview all those who contributed to the scoping study, but not to cover any ground that was already explored to avoid additional burden on interviewees. The scoping interviews focused predominantly on the factual understanding of the programme and its delivery processes while, the main stage stakeholder evaluation interviews will focus on questions about effectiveness of these processes (for the process evaluation) and on realisation of outcomes (to feed into the CA & PT framework). This will keep overlaps between the interviews to a minimum. Where possible, the member of the evaluation team who conducted the interview at the scoping stage will also conduct the main stage evaluation interview.

We propose to largely follow the profile of interviews outlined in our proposal, split across the three phases as the list is comprehensive and informed by interviews with key stakeholders. There are small changes to the balance of interviews for each stakeholder group and phase reflecting our findings following the review of programme documentation and webinars with projects that took place in week of 12 to 17 July 2021 (implications on consumer research are outlined below). The total proposed interviews remains the same as in the original proposal.

We agree with the steer in the ITT that in order to overcome issues of optimism bias, it would not be sufficient to rely solely on interviews with representatives of competition winners to gain a full picture of the delivery of GHFIF. In Phase 1, we suggest approaching representatives of all 12 organisations who expressed interest in the competition but did not submit or full stage application, or submitted an unsuccessful application, in order to gain a fuller perspective on the barriers to participation in GFHIF. Table 5 below provides an overview of the sample of planned achieved interviews across the three phases.

Table 5. Split of interviews by group and year

Stakeholder group	Key focus areas and alignment with evaluation approach	No. of Interviews 2021 (Phase 1) (sample)	No. of Interviews 2022 (Phase 2) (sample)	No. of Interviews 2022/23 (Phase 3) (sample)	Total
GHFIF programme delivery team (former and current) Includes DESNZ programme leads (2), MOs (3) and assessors (3)	Inform ToC and evaluation framework refinement, plus planning consumer research. Stakeholders involved in early phases of the programme design and deliver, assessor[17] and monitoring officer interviews in particular for process evaluation. MOs to provide insights on outcome realisation and feed into case studies.	6 (8)	2 (8)	2 (8)	10
DESNZ GHFIF policy team	Inform ToC and evaluation framework refinement, plus planning consumer research.	3 (3)	1 (3)	1 (3)	5
SICE and EEL SROs	Inform ToC and evaluation framework refinement, plus planning consumer research.	2 (2)	0 (2)	0 (2)	2
Competition winners (Senior reps within lead project developer firm) 101 one lead representative and 102 and 103 two leads;	To develop in-depth case studies to give an understanding of the complexity of each project, their motivations to participate in the GHFIF. Also informs process evaluation.	5 (5)	5 (5)	5 (5)	15
Representatives from each consortium members involved GHFIF projects (project developer wider consortium partners) 101 has one partner, 102 has two	To develop in-depth case studies to give an understanding of the complexity of each project, their motivations to participate in the GHFIF. Also informs process evaluation.	4 (4)	4 (4)	4 (4)	12
Staff from organisations submitted expression of interests but did not participate in the programme	Process evaluation and selection of control group case studies – assess progress to date with implementation, what worked well and why.	6 (9)		3 (9)	9
Mortgage/EE/green finance market sector experts	Feed into the State of the Market Review and wider context for CA and PT.	4 (12)	4 (12)	3 (12)	11
Total no. of respondents		**30**	**16**	**18**	**62**

[17] Assumes assessor contact details can be shared

Case studies

While the CA and PT framework help to assess the impact of the programme at the overall level, we proposed using project level case studies to explore specific causal mechanisms and demonstrate how outcomes within each of the projects were realised in what context and for whom the projects worked well.

Interviews with representatives of the 3 projects will be used to underpin the development of the case studies. Each group was interviewed for this purpose twice, during Phase 2 and again in Phase 3. To gain an overall picture of the experience of each organisation engaging with GHFIF, other sources will be used including, but not limited to: GHFIF programme documentation, any available analysis of EPC and equivalent data from bespoke online tools, insights from Consumer Research interviews, and a review of final reports developed for each project and their potential benefits (drawing up on EREDA’s technical expertise). Each of the 3 GHFIF projects form a bespoke case study individually. In addition to the project case studies we propose to undertake 2 benchmark case studies on products of lenders who indicated interest in early engagement with the programme. This group will be selected on the back of the findings from the State of the Market Review, by comparing the findings with the list of interested parties in the early stages of the GHFIF competition.

The project and benchmark case studies will highlight how GHFIF accelerated product development of supported products, in comparison to lenders which didn’t receive support. These will allow reflection on success of potential rollout and uptake of each product in light of broader contextual factors which can impact delivery. The case studies will be delivered along with reports at the end of phase 2 and 3.

Project case study outline

Three project case studies will be conducted, each 5-6 pages in length and the structure will include:

- **Introduction to the project:** this will set out the basics of the project such as its scope and remit, aims and objectives, and the geographical areas it is operating in.
- **Partners involved**: this will set out the key partners involved in the project, how the partnership was established and motivations of different partner types from the outset, as well as those that were recruited during project delivery.
- **Project timeline and progress**: this section will set out the key project dates, including work package start dates, key project milestones, and dates of publication of notable findings. The section will also include key developments for each project and interactions or overlaps between the three projects.
- **Key achievements to date**: drawing on monitoring information analysis, stakeholder interviews, and desk reviews, this section will outline each case study’s key achievements to date. It will focus on three areas:

- Technological barriers overcome
- Sustainability and commercial success
- Implications on industry and policy

Benchmark case studies

Two benchmark case studies of 2-4 pages will be conducted. Their a structure will mimic the one of project case studies but include a description of the way that product development was financed, in comparison to the project that formed the initial EOI idea.

State of the Market Review

The objective of the market review is to determine the scope and details of the current offerings of UK lenders for homeowners to invest in energy efficiency for their domestic dwellings. The purpose is to provide information on the current state of the UK's lenders market in terms of the features of such products. It will provide insights into how the market might be incentivised to offer compelling and attractive investment products with an appropriate balance of risk.

The State of the Market Review will involve an online search of existing financial products from a range of small and large UK lenders (8), supplemented by interviews with green finance sector experts (2). The review will focus on the listing of mortgage lending institutions as outlined by the UK Finance industry association of lenders. The review will comprise:

A desk-based review of existing financial products from the current set of 84 UK lenders, setting out an agreed list of features, including: scope, interest rate, term, eligibility conditions, fees and penalties, security, insurance requirements, etc. Using the Finance UK list, each institution will be searched for available mortgage and loan products that specifically refer to a list of terms (such as, energy efficiency, EPC, green or sustainable homes) to identify the products being offered with energy efficiency benefits. Where available, company reporting to the FCA, or public accounts will be used to determine the size of the energy efficiency investment on their loan books.

The desk-based review will develop an Excel sheet with all the reviewed products according to their agreed (with DESNZ) features. The features of loans and mortgages that would be considered would be those that focus on both incremental energy efficiency investment (in other words, the addition loan value associated with an increased level of energy efficiency provided by retrofits) and the overall energy efficient value (the total cost of a property meeting a certified high efficiency standard, such as EPC A or BREEAM Excellent).

As part of the review, a set of approximately 10 non-GHFIF lender/industry expert interviews will be undertaken. The potential lenders and contacts will be identified through both links with the Green Finance Institute and also identifying key individuals within those institutions through online company and social media (such as LinkedIn) profiles. For example, EREDA have worked closely with the Green Finance Interview (GFI) and several of their members, both within the LENDERS project (Nationwide and Principality) and other institutions which we have worked directly with (HSBC, Lloyds, NatWest, Hinckley & Rugby Building Society). The scope of the interviews will focus on:

- Section A: Introduction and awareness of GHFIF (5 min)
- Section B: Current green loan products (5-15min)
- Section C: Thinking about customers (10min)
- Section D: Reflecting on current green loan products (10min)
- Section E: Future development (15min)
- Section F: Final reflections (13min)

The nature of the market will be determined in terms of:

- Size: determined by the total number of potential loan holders that could benefit from the existing loan offerings. The eligible market size will be determined by reviewing the current English Housing Survey that provides details on home energy performance and the mortgage and household investment in energy efficiency. An assessment will use the number of dwellings, their energy performance levels, and the home ownership and probably of investment to help in determining the market size.
- Key firms: a review of the Finance UK top firms in terms of what products are being offered and a quantitative (if possible) or qualitative assessment of the firm lending size.
- Potential market trajectory: the potential market will be determined by using current lender criteria and the prospective entry criteria (based on interviews) with market size potential and data from the EHS to estimate what the current potential opportunity exists for lending among the key customer segments.

The State of the Market Review is being undertaken during June to August 2021 and will be updated during Phases 2 and 3 following the same methodology to ensure consistency and comparability of results.

Consumer Research

To understand the role of green finance products in driving energy efficiency/low-carbon heating upgrades amongst homeowners, it will be important to capture homeowner perceptions and experiences through semi-structured qualitative interviews. The customer interview strand consists of a further 39 interviews with GHFIF products' customers.

Recruitment – To access customers, we are reliant on securing buy-in from the three project leads. We know from the scoping study, and our own work with banks, that they have very strict data sharing agreement protocols. It will be unlikely that they will be willing to share customer contact details, while they may also be concerned about over-burdening customers.

We will therefore explore the feasibility of accessing consumers through discussions with project leads. We will:

- introduce them to IFF Research (IFF),
- outline the aims of consumer research and highlight how the findings can benefit their strategic decisions,
- outline the rationale to customer engagement,
- explore any previous research with customers in case we need to consider this in customer communications,
- discuss what additional interview topic coverage would help their work,
- explore how we can access customers either directly or indirectly.

Critically, we will tailor our recruitment approach according to the needs of each project. The most efficient solution would be for project leads to send an IFF-drafted email to customers that invites them to click an IFF-programmed link, allowing them to consent to the research. We will apply learnings from what works in encouraging participation in research with bank customers, including financial incentive (£40 per participant), reassuring communication that highlights ethical considerations and includes the project lead's branding to engender trust, and emphasising how their participation will support broader decarbonisation goals. IFF specialist qualitative recruiters will schedule interviews with customers who consent to the research at a time that suits the customer.

Topic guide design – IFF, in collaboration with Technopolis, will develop a topic guide for each phase. Questions will be framed in an open manner ('Why?', 'How?', 'In what way?') to enable the research to uncover the depth of customers' experiences and contexts. While core questions will remain consistent across all customers, there may be some tailoring of sections depending on the associated product. This also helps to strike a balance, delivering depth of insight without overburdening participants with long discussions. Our current thinking for topic coverage is summarised in the table above. Homeowners may struggle with recall so a pre-task warm-up exercise will be used to remind customers of the product, while exploratory questioning, and 'journey mapping' will be used to understand their current context (knowledge, attitudes and circumstances related to the product), how they arrived where they are, as well as mapping product experiences and needs.

Fieldwork – Experienced qualitative IFF researchers will conduct all interviews, lasting up to an hour. They will take place by telephone or video call, dependent on customer preference. Our approach to in-depth interviews is to conduct these as a genuine two-way dialogue, in which the interviewer actively listens to the participant feedback, takes an initial view on the implications of this and devises relevant follow-up questions, using the agreed topic guides.

Data management and analysis – All interviews will be recorded with consent and interviews written up thematically by the researcher using a consistent analysis framework. Our analytical approach is structured by the evaluation questions but builds upwards from the views of participants. We will also conduct Director-led analysis sessions involving the full team, to consider the implications of the underlying factors that influence product delivery and outcomes. Consumer interview findings will also feed into contribution analysis.

The table below outlines our sample structure and proposed interview content along with emerging conclusions on the approach from webinars with project leads that were held in week commencing 12th July 2021. It appears that currently we will be able to deliver the consumer research for all three projects but there is currently some uncertainty about GHFIF102, where Lloyds Bank have own research and insights team who conduct research with their customers and may be interested in taking over the fieldwork. Where possible, we aim to follow-up with some of the Phase 2 participants in Phase 3, alongside ‘fresh’ sample.

Table 6. Updated approach to Consumer Research

Provider	GHFIF 101: Home Infrastructure Technologies (HIT)	GHFIF 102: Lloyds Bank Group	GHFIF 103: Monmouthshire Building Society
Product name	Add to My Mortgage	Green Home Mortgage	Valuations and Lending Underwriting Energy Reduction (VALUER)
Provider/Project partners	NatWest and Lloyds Bank In addition, market trial lenders and lender pipeline for future.	Energy Saving Trust	Rightmove, RICS and Sero Energy
Customers #/types	Invitation to product went to 203 homeowners and 125 landlords. Currently, everyone on live platform is an owner occupier, but by April 2021 landlords are expected to be in the mix. Homeowners & Landlords, all owner of UK property with a mortgage (and the mortgage lender has to be on the panel, which is currently about half lenders in the UK market) and want to upgrade green infrastructure in their home.	Two customer groups: • 2,000 homeowners registered interest only by end of May 2021 deadline. • 40 who registered and have already done home improvements (this number likely to increase as customers have until December 2021 to complete improvements).	Two homeowner groups: • Current estimate of 50 who sign up in the future for mortgage calculator. • Estimate 100 who (also) sign up for whole home survey. • Also, a landlord group.
Proposed consumer sample revisions	Suggest excluding landlords, green vendors and mortgage lenders, and suggest Phase 2 x8 interviews are split equally between homeowners who 1) searched for energy efficiency measures that they want to install in their homes: and 2)	Suggest skewing Phase 2 x8 interviews to those who have done home improvements (6 interviews) and using x2 interviews for those who registered only to understand barriers to take up.	Suggest excluding landlord group, and splitting Phase 2 x8 interviews equally between mortgage calculator users and whole home survey users.

	searched plus went on to pay for installations.		
Consumer recruitment Phase 2 timing	As planned, April 2022 – NB: the platform will be more refined/established, meaning we will capture more relevant views on delivery (not early development experiences). Nature of their product means once a homeowner uses it they are finished with HIT engagement and only work with their lender. Need to sample from the last couple months before fieldwork, for recall improvement.	Possibly January 2022 because it would be a year after registration for group 1 (registered only) if original timeline is followed.	As planned, April 2022
Consumer recruitment approach	Assumed to be opt-in approach via HIT emailing out to homeowners using the product but HIT. To be confirmed.	Assumed to be opt-in approach via mortgage advisors and direct communications from the lender (e.g. newsletters) but Lloyds. To be confirmed. Planned reminder emails about registration/improvements in Oct and Dec 2021 present an opportunity for inclusion of reference to the research in these communications.	In August 2021, agreed MBS would add lines about research interviews to the registration confirmation, to 'prime' customers for April 2022 fieldwork: "We want to understand your experience of this product and how we can improve our offer. Our research partner, IFF Research, will be conducting telephone interviews in April 2022 and we may be in touch inviting you to this research. All who take part will receive financial compensation for their time.". More customers who sign up for whole home survey so need to split interviews between this audience

			and those who sign up for the mortgage calculator only.
Additional steer on consumer research content	Accessibility of product Motivations for chosen installations	Impact of Lloyds including a hallmark in their product e.g., whether/how motivating, whether noticed it?	Motivation at the time of product use – green aspect, or other? Was this tool considered as part of choice to go with the lender? Whole home survey – how many undertake steps they propose; what their plans are; how much is decarbonization a priority? Is the whole home survey 'nice to have' or 'a key aspect of the lending offer'?

Analysis of primary and secondary data

The planned 101 semi-structured interviews across the three phases will produce a large volume of qualitative data that required careful organisation and management for structuring the analysis.

The semi-structured interviews with various groups of stakeholders will produce a large volume of qualitative data that will require careful organisation and management for structuring the analysis processes. This sub-section provides an overview of our approach to collating, transcribing, verifying, managing and analysing this data.

All stakeholder interviews will be audio recorded (with respondent's consent) and then transcribed into individual Word documents. These Word documents will be structured using consistent templates, based around each of the questions in the Topic Guide. The write-ups will be reviewed for any missing information (such as where the audio quality was poor, or where there was insufficient time to cover all questions), or where the meaning behind a response given is not clear. In cases where interview write-ups lack important information, or certain responses require further clarification, we will send summaries of the interview to the respondent to request their input to add, amend or clarify these sections. This opportunity to check write-ups is generally welcomed by respondents, who are often keen to ensure their views have been captured and interpreted accurately. Interview notes from Consumer Research and State of the Market Review will be collated in summary format with verbatim quotes but not as transcripts.

The interview transcript documents and notes from Consumer Research and State of the Market Review will be stored in Nvivo. Nvivo is a Computer Assisted Qualitative Data Analysis Software (CAQDAS) package which is used to provide structure to qualitative data and support systematic organisation of text, coding and analysis. It may be used to analyse interview transcripts and also to be linked and coded alongside other data sources (for example, quarterly reports submitted by the projects describing uptake of their tool or newly added design features of a product), insights from Consumer Research, case study documentation, and so on).

It provides a way of highlighting text and placing it into an unlimited number of categories or concepts, usually by theme. These different concepts are assigned to "Nodes"; a function for assigning labels to different themes of interest. For example, lists of nodes may be developed to provide examples of evidence which support each contribution claim in the CA-PT Framework, in support of either the programme theory or the alternative theories, or indeed, new explanations of why certain outcomes have arisen that were not previously taken account of. This allows for both a 'top-down' analysis of results against the CA-PT Framework, as well as allowing for a 'bottom-up' emergence of new theories to arise from the data.

Once findings are assigned to their relevant 'nodes' we will run 'data queries' to produce quasi-quantitative overviews of the frequency distribution of metrics of interest. For example, to provide an analysis of the proportion of cases (with a case being each individual interview) where the evidence observed supports the pass or fail of a relevant Process Tracing test.

Annex B: State of the Market review

Acknowledgements

The State of the Market Review was prepared by Dr Ian Hamilton, Dr Catherine Willan and Dr Shih-Che Hsu from the UCL Energy Institute.

Executive Summary

The State of the Market (SOTM) Review aimed to understand the range of products being offered for investing in the energy efficiency of UK owner-occupied dwellings, the view that providers had of both the products and the current market, and also an estimate of the potential for those products more widely among UK owner-occupied households.

The objective of the market review was to determine the scope and details of the current offerings of UK lenders for homeowners to invest in energy efficiency of their domestic dwellings.

The SOTM comprised a desk-based review of all existing financial products available to owner-occupied households available as of July 2021, a set of exploratory interviews with nine stakeholders from across the retail banking sector who offer investment products to households, and an estimation of the size of the owner-occupied market for investing in energy performance based on ownership structure and financial asset conditions.

Market Product Review

The **number of products in the UK for lending for energy efficiency investment in new and existing homes are not insignificant**. The **UK lenders appear to have a strong offering of products** geared towards those looking to purchase or to improve the energy performance of their homes. Although no two products are the same, there are some similarities in the approach, which is to provide discounted rates on the standard rates (fixed or variable), or to offer cashback to more standard mortgage products.

There are **limitations in the offerings** in terms of there being f**ew products having clear requirements on energy performance** levels attained. Those lenders that did have energy performance requirements used the Energy Performance Certificate (EPC) as the standard measure, while several others used Passivehaus. Nor do many lenders offer much description or flexibility in the eligibility criteria of borrowers aside from standard practice requirements on stress tests - most offer reduced rates based on loan-to-value rates.

There **is scope to increase the available products that would see some form of reduced rate at higher loan-to-value ratio** for those who are purchasing with the intention of investing in improving the energy performance. In such cases, the mortgage holder would need extra allowance but would currently be subject to the stress test that would limit borrowing capacity, despite the potential energy cost savings for the home.

Market Stakeholder Interviews

The interviewees expressed a **range of concerns and interests towards green home finance products** and the potential for the market to mature, along with its risks. Although the **lenders interviewed** had not participated in the Green Home Finance Innovation Fund, all of them were **very much cognisant of Government's priority to improve the energy efficiency of homes**. They perceived a definite risk for their businesses in failing to engage with the energy and carbon impact of their home lending, arising from future policy in the short and long term, and from media and investor scrutiny.

However, whilst risk was perceived, lenders views on opportunity were less cohesive. A few within our small sample were positive about the market potential for green home loans, but many remained very sceptical about current customer demand for energy efficient home improvements. **Lenders and experts questioned which types of financing were appropriate for retrofits** and how these might best be fitted to different home purchaser/owner needs (e.g. mortgages, loans, or grants). There was feedback that **other financial incentives could be more effective**, such as adjustments to VAT or stamp duty, to encourage homeowners to seek investment in energy efficiency, and that mortgage lenders were not by default the prime mover.

Significant immediate barriers to action were also **raised** by our interviewees, covering issues from **assurance of outcomes, concerns of liability for energy efficiency installations, adaptations to systems and working practices, and reliance on third parties**, such as brokers, for the delivery and promotion of products. **Lenders** were particularly **wary of direct provision of energy or carbon saving advice**. Longer term, there were fears that a two-tier market might emerge that meant certain houses were not viable for most lending products if there was a high actual/perceived carbon risk. This may be heightened in areas that have limited loan activities, depressed housing markets, or insecure economic conditions. Lenders indicated that the consequences of a drive to improve housing efficiency focused on home lending and EPC ratings could have complex and unexpected consequences that required thorough understanding.

Finally, there was an expression that **more information on what forthcoming planning from Government** would be to which lenders could respond with better targeted products. The ability for lenders to push products is predicated on viability within a stable regulatory environment. There was overall a **view for more holistic planning** and that, whilst lenders were keen to act, enabling conditions and incentives were needed as "lenders alone cannot do it".

It was notable that all lenders, were actively investigating the energy efficiency of their loans, and keen for information to help them progress. Lenders were all aware of the consultation on EPC and more clarity on ways of improving and using EPCs were felt to benefit the market.

Market Conditions

The analysis found that the average mortgage for a typical owner-occupied dwelling was around £56,000, while the average purchase price of a home is £140,740, however households believe that their house value is on average 34% higher at £214,460. This could be thought of as their expected sale price.

The average cost of investing in improving the energy performance of the dwellings, according to the EHS is around £16,300, which brings the average dwelling from an EPC D to an EPC B.

The **EPC improvement investment compared to mortgage costs are on average around 10% of the dwelling asset value**. However, when looking at the **EPC investment to mortgage value, the range is much higher with an average of around 40%**.

The market conditions for lending to owner occupier households to improve the energy performance of their dwellings appear to be capable of absorbing additional loan costs. However, with the **mean cost of improving dwellings from an average EPC D to B at almost £17,000 and around 10% of dwelling value is a considerable sum for many households** and could add significantly to their borrowing costs.

GHFIF State of the market review

The objective of the market review was to determine the scope and details of the current offerings of UK lenders for homeowners to invest in energy efficiency of their domestic dwellings. The purpose is to provide information on the current state of the UK's lenders market in terms of the features of such products. It provides insights into how the market might be incentivised to offer compelling and attractive investment products with an appropriate balance of risk.

The State of the Market Review involved an online search of existing financial products from a range of small and large UK lenders; interviews with lenders and green finance sector experts; and finally, a market size estimate for green mortgage products.

Market Product Review

This section presents the results of a review of financial lenders who provide mortgage and refinancing products to UK households. It covers all products that were on offer as of 25th June 2021. The review included products available from retail high-street lenders in the UK based on their being active in the market and identifying relevant financial offerings. It reviewed products that were available as early as start of 2018 (and still active) as a measure of recent activities in available lending products.

The primary source for identifying lenders for the review is from UK Finance, which is the association for the UK banking and financial services sector representing nearly 300 firms, and several other relevant lenders. The review focused on the top lenders by size of lending along with several other lenders identified via internet-based searches. 84 lenders were identified and reviewed based on their lending size, portfolio and products.

Over 50 green home finance products were identified from across the 84 lenders as being of relevance to this review. The review classed the products according to their target market and detailed specific requirements of the products on offer in terms of amounts, interest rates, fees, eligibility, and some conditional requirements.

In the following section we provide details of the review, the products, and the findings.

Method and approach

The review used an internet desk-based approach to identify relevant products available from the UK Finance and four others not a member of the association. All available products were then described and classified according to a set of features (described below). The full product list is provided to accompany this report.

Sources of the review

The review made use of the UK Finance members list to identify relevant lenders. The UK Finance is an association for the UK banking and financial services sector representing nearly 300 firms and contains the vast majority of lenders active in the UK. Several notable exceptions to membership of the UK Finance that were subsequently included were: Halifax, BNP Paribas, and Ulster Bank[18], though this is not a definitive list.

The UK Finance Largest Mortgage Lenders 2020 ranking lists were used for searching existing products. The objective being that lenders in the largest groups would cover the majority of both lending activities and also the type of products being offered to the market. This does mean that very small lenders and their products are not included in this review.

The four UK Finance 2020 annual ranking lists by value were:

- By value of mortgages outstanding (inc. 78 firms)
- By value of gross lending (inc. 78 firms)
- By value of Buy-To-Let (BTL) mortgages outstanding (inc. 64 firms)
- By value of BTL gross lending (inc. 64 firms)

In total, 84 mortgage lenders were included in the review, which included 81 unique lenders from the four UK Finance ranking lists.

To conduct the review, the website for each of the 84 lenders was searched for products using key terms including: *green*, *energy efficiency*, *retrofit*, *sustainable*, and *eco*. Each term included a wildcard (*) in order to ensure broad inclusion.

In addition, a search of products that included the terms "*green*" or "*energy efficiency*" mortgage and was conducted via Google UK and Google UK News search. The news search also helped to add further information regarding product date and other features not described by the source lender.

Products were defined as those with different names and funding objectives (e.g., purchasing or retrofitting), having different interest rates, initial periods, Loan-To-Value (LTV) percentage, and energy performance criteria. If any products were identified through the different search strategies (i.e. company website or UK Google) that were described using different wording/names but included the same features as another similar product with a different name, these were considered as the same product and only one was included.

All products included in the review were active on/before 25th June 2021.

Findings

In total, the review identified 51 green finance products from 34 lenders (40.5% of 84 lenders in the review). The key findings were that among the 34 lenders:

- 26.2% (22 out of 84) of lenders currently have green home finance products on the UK market.

[18] Note this is not a definitive list, but a list based on cross-reference to known lenders via the internet search for products.

- 14.3% (12 out of 84) of lenders have expired, piloting, under-planning, or non-UK-market products.
- Eight firms have 2 products, Dudley BS has 3 products and Ecology BS has 8 relevant products.

The 51 identified products are categorised into 6 types:

- Green mortgage – generic for homes
- Green mortgage – generic for other properties[19]
- Green mortgage – specific for retrofit only for owner-occupier
- Green mortgage – specific for retrofit only other properties
- Other – including service, cashback only, under-planning products

Figure 3 below shows the range of products on offer across the lenders categorised by product purpose.

There is no data to show which product offering might be more sought or commonly secured by mortgage holders, though if number of products is an indicator, retrofit and additional borrowing are among the top. These types of products may have an advantage that they will be securitized against the built-up asset value of the home and therefore perceived as lower risk.

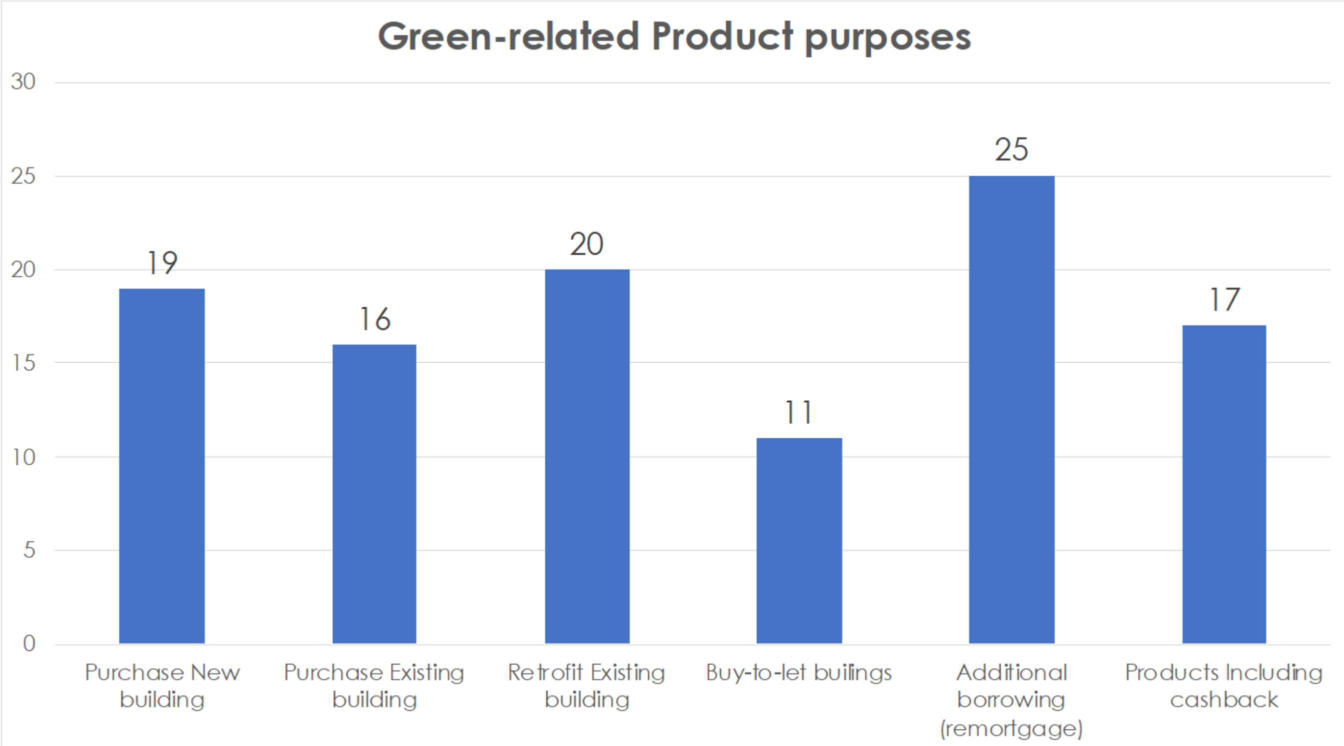
The next group are new building, existing building, and products with cashback. For these, they imply a new purchase and are more likely affected by the mortgage holder’s ability to service a loan overall and will be subject to mandatory stress-tests that may reduce the number of eligible consumers for these products if additional green borrowing is not separated from the stress test. No products described their stress-test conditions in detail.

The review found that no two products are exactly alike and, where explicitly mentioned, each has varying eligibility and requirements around the performance levels sought/achieved.

Most of the products (38) are in a fixed discounted rate for 2 to 5 years, but some products (5) were in a variable discounted rate for 2 to 5 years. No particularly trend emerged in additional fees, penalties (early repayment charges (ERC)) and insurance requirements. Only 15 green products need EPC band B or above for new home purchasing and 8 need at least EPC band C for retrofit.

[19] Other properties includes Buy-to-Let properties, second homes, and investment properties.

Figure 3 - Market review green mortgage product focus



Of the 18 Green mortgage – generic for homes, but excluding retrofits, the offerings included Barclays's mortgage for first-time or existing customers with a 0.1% below the standard rate (depending on customer loan-to-value ratio), or Ecology with a varying (increasing) discount rate based on the performance standard sought - 0.5% discount for EPC band B (SAP88+) or 1.25% for Passivehaus. While Melton Mowbray Building Society offers a discount of 0.6% from the standard variable rate for 36 months.

Some retrofit mortgages limit the percent of money spent on improvements (e.g., Nationwide, Newbury BS), some of them ask for the approved EPC ratings (e.g., L&G Home Finance), and some use EPC ratings as criteria of interest rates (e.g., Ecology, Landbay Partners Ltd). Other lenders only have green products in their countries outside of the UK but not for the UK branch (e.g., Santander in Spain, Bank of Ireland and Ulster Bank in Ireland, Danske Bank in Denmark, Pepper Money in Australia). However, the review identified some European lenders (e.g., BNP Paribas) who provide green mortgages in Europe as cooperating with UK energy providers (e.g., E.ON UK) in piloting innovative Green Mortgage product under European Energy Efficient Mortgage Action Plan (EeMAP). It is not clear whether lending access to European bonds is affecting mortgage offerings.

Market Stakeholder Interviews

This section presents the results of ten interviews conducted with eight lenders and two experts in the UK mortgage market, reflecting on current offerings for homeowners to invest in the energy efficiency of their properties. It covers only lenders who were not funded by the Green Home Finance Innovation Fund, as GHFIF participant views were captured through the evaluation. The interviews are designed to complement the other State of the Market work, by providing the opportunity to understand lenders’ views and progress in developing and deploying their own green lending products, and their views of the overall market. The interviews with market experts were intended to access a wider-angle perspective on market developments. Together, the findings of these ten interviews offer initial insights around the scope and scale of current products, the incentives for them, and of perceived challenges to further development, or indeed suggested solutions.

Method and approach

With only ten interviews, a representative sample is not possible, however, size (based on mortgage balance and market share in UK), type of institution (bank or building society), and type or extent of financial products offered were taken into consideration when the sample was purposively selected. This included lenders who had yet to launch specific green lending products, as well as some who already had a range of offerings. Interviewees likely to have direct experience of these products, or their development, were targeted. The two market experts were selected based on their individual expertise in this area, but also considering the activity of their two organisations in catalysing green lending.

The interview guide was prepared in a semi-structured format, and tailored to allow for alternative approaches depending on whether the lender had already launched green products, or was still developing them. The questions were focussed around:

- Awareness of the GHFIF
- Current green lending products and reasons for developing these
- Views on current market for green lending products
- Practicalities and any challenges of developing these products
- Perspectives on future developments
- A second guide was prepared for market experts, and covered:
- Views on current market for green lending products
- Reflections on key performance issues for the products
- Perspectives on future developments

The interviewees were invited personally via email in late June and early July 2021, and interviews completed in July and early August 2021. The interviews were all carried out remotely via video call. Most of the interviews were with one employee at the lending institution, but in the case of two lenders, more than one individual was interviewed during the call. The interviews were all recorded and transcribed verbatim.

Due to the commercially sensitive nature of product development and performance, the research design emphasised informed consent from the participants and the anonymisation of their contributions. Material from the interviews has been fully anonymised in this report, with company names, individual names, and job roles removed. For ease of reference, the lenders and market experts have been simply numbered 1-8 and 1-2 respectively. The initial email to potential participants explained the evaluation and its background, and further explanation of the treatment of the insights and personal data, as well as the right to withdraw at any time, was also given at the beginning of the interview. However, it was noted during several calls that the interviewees were in fact keen to participate in the expectation of the evaluation providing findings that would be useful to them, and this is discussed at the end of this section. The following sections present the findings emerging under each of the interview themes.

Key themes arising from the interviews

Awareness of the Green Home Finance Innovation Fund

Interviews began by asking about lenders' awareness of Government's priority to stimulate lending for green home improvements, and then specifically about the GHFIF. Although lenders were aware of Government's priority in general, some lenders were not aware of the GHFIF specifically. Others had heard of it, but had decided not to bid for it. Reasons given for choosing not to bid included practical constraints on time and resource. For instance, Lender 3 explained that "it didn't reach the top of the agenda" as there were many other pressing issues to maintain business-as-usual. Another lender had feared the bid would absorb too much staff time to compensate for the small level of funding on offer, and another indicated that the window for application was too short, suggesting a rolling funding opportunity would have suited them better. Another reason given was that the lender did not feel ready to take on green lending at that point in time, as it was too early in their thinking.

Other policy initiatives did appear as a stronger influence on action. Government's consultation on "Improving home energy performance through lenders" was frequently mentioned, particularly in relation to the disclosure of portfolio Energy Performance Certificate (EPC) data, and any possible targets to improve these[20]. Lenders felt that, if they were to be "assessed" on EPC ratings, then this would provide a powerful – if not necessarily welcome – incentive to target EPC ratings. The other policies mentioned, although with less emphasis, were the Minimum Energy Efficiency Standard (MEES), both in its current form and possible extensions to it, and the Green Homes Grant Scheme.

Current green lending products and motivations for developing these

The eight lenders interviewed were at varying stages of product development, and also varied in the type of products they were either already offering or developing. Three of the lenders had been on the forefront of green lending, having launched products several years ago, and some of these were now actively considering how to develop these further. Three lenders had very recently launched lending products. Two lenders had not yet launched any green offerings. However, the majority of lenders spoke about green lending products in novel terms, and were still actively gathering learnings from their products, even where they had been active in the space for two or three years.

Interviewees noted a wide range of motivations for developing green products. The key difference between lenders was a variation in how confident they had been in entering the green lending space, and, when they had entered it, the extent or type of product scope. This aligns with the findings from the review of green finance products on offer presented in Section

[20] Note that these interviews were carried out prior to the publication of Government's Heat and Buildings Strategy

1, which describes significant variation in the types of product related to green home improvements in the UK market overall, but may partly be due to the purposeful selection of a varied sample. The lenders and experts interpreted a wide range of offerings as falling under the broad categorisation of green home finance. These included mortgage products, targeted at energy efficiency through either new or additional borrowing for retrofit, or mortgages on new-build properties. In these cases, a discount was often offered on the standard rate of borrowing for properties meeting the requirements. However, cash back rewards were also mentioned. Three lenders were also offering products with an educational element, ranging from training for their staff, to factsheets and app-based material aimed directly at homeowners. One lender was targeting specific types of home energy efficiency improvements. Finally, both homeowners and buy-to-let landlords were covered.

One key motivation for launching products was lenders' urge to keep up with activity amongst their competitors. One of the market experts characterised this as lenders' fear of their organisations falling behind peers, with one lender describing how they felt increasingly pressurised by internal management to justify why their organisation had not yet entered the space. However, this view is balanced by financial caution:

> *"Actually in the banking sector, quite often institutions want to see that a product has been successful and has a proven track record before they enter that space."*
>
> *Expert 2*

Nevertheless, interviewees did perceive a definitive and recent market acceleration. This had prompted some lenders to test demand and the concept of green lending through a cautious product launch. As noted above, moving into green lending was still a relatively recent move for most, and the products mostly remained niche offerings. In some cases, lenders were more cynical, suggesting that their products might be more of a public relations boost, aimed to assuage the need to be seen to have done something, or a way of testing the water:

> *"We were very clear that launching a product was actually a very small step in this whole journey, because the level of awareness and education of our customers was particularly low and we use that as a proxy for the market."*
>
> *Lender 5*

More profoundly than this, and as can be seen in the quotation above, a significant level of scepticism was apparent around the extent of the demand for green lending products. The need for customer education to prepare the ground for products comes across very strongly. The main doubt – frequently expressed – was that customers are not interested in the energy efficiency of their properties. Therefore, it was not, in the opinion of the interviewees, the availability of finance stopping customers taking action:

> *"Do I think tens of millions of home owners are chomping at the bit to replace their boilers at their own cost? I would say no."*
>
> *Lender 2*

The interviewees were also prompted to discuss the potential financial case for green lending, such as possible better payback rates, or loan-to-value (LTV) ratios. One expert and two of the lenders reacted positively to this, raising evidence of lower default rates on green loans. One of those lenders also believed that the installation of green measures helped to protect the capital value of the property:

"Intuitively we have a belief that the work that's done by the consumer around green will not increase the value of their property, but it will protect the value of their property and stop it eroding."

Lender 5

However, the majority of lenders did not perceive a clear financial case for lending products targeted specifically at green homes, and some were very sceptical of the available evidence. The two experts were more optimistic about the potential market: lenders overall tended to consider that the products launched so far have very limited take up, and that the market is far from proven.

Another motivation to develop green lending products that appeared frequently, but was unrelated to market demand from homeowners, was reporting pressures. Shifts in the corporate reporting landscape in the UK appeared to have reframed green products as one means to address concerns about the emissions-intensity of lenders' mortgage portfolios, and to respond to the increasingly influx of investors', and other stakeholders', questions on Environmental, Social and Governance (ESG) issues. As such, this acts in a similar fashion to the potential disclosure of EPC data previously mentioned, encouraging several of the lenders to analyse their portfolio efficiency, but was felt to be an increasing trend beyond legislation:

"We track green content in our investor meetings on a regular basis, and over the last 18 months, the investor interest in everything, from [our] risk management approach to our propositional approach to transition, it's an ongoing, constantly increasing theme. And we're starting to see, from the people that hold our capital instruments, it's gone from a box tick exercise probably 18 months, two years ago, to they have some real specialist expertise and knowledge now… I guess that's… probably driving us at a faster pace at the moment than the regulators are, I think their expectations are moving a lot faster in terms of what we do, what we offer, what we disclose in particular."

Lender 3

Language such as "stranded assets" and "transition" risks emerged quite strongly from the interviews, although lenders were still coming to terms with it:

"We are fairly new in our understanding of stranded asset risk, I'll be honest."

Lender 6

Once again, competition between lenders emerged, but this time in terms of disclosure.

What is particularly interesting about this is the apparent contradiction between lack of conviction in the financial case for green lending and the apparent concern over stranded assets. However, there is some evidence that lenders thought this was more about protecting the business from transition risk, as indicated in the quote from Lender 5 above, rather than a positive opportunity to make profit. There also appear to be strategic, rather than financial, reasons for pursuing green lending and attending to portfolio energy profiles, as both these increasingly feed into corporate greenhouse gas reduction targets, notably Net Zero commitments and Science-Based Targets, which are very visible externally and therefore put lenders under scrutiny:

> *"If we don't have a greener mortgage proposition that evolves over time we will have a reputational issue. For customers and with shareholders, and ratings agencies".*
>
> *Lender 4*

Customers for current green lending products

As already discussed, where lenders did already have green lending products, these were often very new offerings, niche offerings, or both. As such, there was little quantitative data on lending outcomes, such as financial performance or energy savings, nor had a typical customer profile been established (or at least lenders did not feel confident in sharing these details). A few lenders indicated they were undertaking market research to attempt to understand more about prospective green lending customers. However, many felt that data on the nature and extent of potential demand was seriously lacking, and would clearly welcome it. Only one lender felt very positively about the market potential, when considering single measure energy efficiency improvements, where they perceived a large market gap for financing.

The main barrier, as already noted, was a perceived lack of awareness or interest in energy efficiency amongst homeowners. This was mentioned in almost every interview:

> *"I think the key piece in the puzzle is how you create the demand for green finance rather than the availability of green finance."*
>
> *Lender 3*

Lenders argued that finance is already there for those who want to improve their homes' efficiency. Thus, the barrier to retrofit is not necessarily availability of credit, but, lenders believed, the lack of customer knowledge and interest in energy efficiency. Lenders questioned whether the EPC – or indeed energy at all – was the best the way to engage potential customers. Some thought that other issues might resonate more, such as flood resilience (again, it should be borne in mind that these interviews were carried out before media headlines around rising energy costs began to emerge).

Many barriers were felt to underlie this lack of customer momentum. For instance, customers, it was claimed, do not know who to call or what order to do things when considering energy efficient or low carbon renovations. For others, it may seem like an "optional extra" that may never get actioned. Furthermore, some lenders thought that customers were unlikely to tolerate the disruptions of retrofits. Some lenders thought that customers were waiting for government to allocate grants in the future, rather than putting aside their own funding. The lack of a convincing financial case for homeowners was also noted by interviewees. With mortgage rates currently very low, lenders felt that rate discounts for greener properties were not attractive enough to customers. Payback periods for retrofit were held to be too long, rendering capital expenditure undesirable. This was exacerbated by the relatively frequent rotation of property ownership. For the fuel poor, with a more urgent need to consider energy costs, the interviewees felt that the provision of lending is unsuitable, and indeed potentially unethical.

Some interesting issues were raised around the nature of relationships with homeowners. Lenders noted that customer trust can be low, in particular around installers of energy efficient or low carbon technologies. They believed that customers were also likely to take a dim view of any perceived “cross-selling” by lenders of these technologies or installation services. Furthermore, one lender pointed out that customers in the UK are not typically loyal, as they rotate through lenders looking for the best rates. Thus the lenders’ opportunity to influence customer choices is restricted, there is less opportunity to develop a personal relationship between lender and customer, and advice is correspondingly harder to give. One lender who did provide mortgages for non-standard “higher risk” low carbon properties revealed that despite efforts put into building up relationships with their customers, which are necessary to understand the nature of the property being lent on, the customers often left once they were able to move to a more generic, and cheaper, mortgage. For lenders keen to improve the average efficiency of their portfolio the potential loss of any improved properties is a disincentive. This indicates that costs and benefits may not arise evenly or predictably from expanding green home lending.

Reflections, practicalities, and challenges for green lending products

Lenders revealed a number of challenges to developing and deploying green lending products, in addition to the issues with demand noted above. Assurance of energy efficiency outcomes appeared as a very significant issue. For volume lenders, asking additional questions or adding assurance steps increases cost, which their margins cannot absorb (raised for example by Lender 3), or indeed which customers might not accept. Additionally, volume lending at low rates has a huge pool of potential customers in the UK. Thus, they have no immediate commercial need to chase harder-to-reach new business.

Concerns over proving the “additionality” of lending were also raised. Combined with the difficulties of assurance, this raised a risk of greenwash accusations and an inability to assess the energy efficiency benefits accruing to the mortgage portfolio:

> *“When we release the funds we have no means of checking what the customer then goes on to use those funds for. They could go and buy a diesel car with those funds, they could buy a plane ticket around the world, and no large volume lender is able to validate how those funds are spent at the moment.”*
>
> *Lender 1*

Lenders therefore felt in a bind: wanting to confidently assure assets as “green” but not willing or able to bear the cost. Longer term, lenders would like to be able to securitise green debts, but in order to make this viable, the volume of lending needs to be much higher (one lender suggested a minimum figure of £200m), and high-quality assurance is essential.

Related to this, concerns with EPC data were raised. Firstly, EPCs are not available for many properties, and when they are, they are not held to be reliable (several lenders quoted research indicating their inaccuracies). Nevertheless, they are the tool that is most widely available, as there was not held to be a feasible alternative. The availability of an EPC was one reason given for lenders to tailor products to new build or new purchases, rather than retrofit. Many lenders have had to interpolate the EPCs on a high percentage of their loans to cover the missing data, and they felt that this compromised their ability to assess the energy efficiency of their lending portfolio.

A further concern to arise frequently, and with some emphasis, was liability. Lenders viewed the provision of energy efficiency advice as problematic. They operate in a sector where financial advice is very highly regulated, and they clearly feel comfortable when within their own realms of expertise. Lenders felt correspondingly exposed on the unfamiliar topic of energy efficiency. They feared being targeted by claims companies, allegations of mis-selling (citing the history of financial scandals), and liability for botched installations:

> *"I'd use the word 'guidance' rather than 'advice'. I think when you start using the word 'advice' you stray into a world where you open yourself up to claims."*
>
> *Lender 1*

Long term policy consistency was also raised as an issue here, with fears that if policy were to change, the advice given to customers might no longer hold. Potential competition issues in recommending particular suppliers were also raised as risks. For one lender, the issue of liability had led to a deliberate emphasis on "traditional measures", such as double-glazing or boilers, which were perceived as being reliable. One suggestion was for the establishment of an equivalent to the Energy Technology List[21] as a tool to assess reliable home energy efficiency measures and hence provide "pedigree" (Lender 7). Overall, the role of advice was held to be difficult: lenders felt that customers need advice to catalyse them to action; but that giving this advice was risky and removed from their expertise. Lenders were somewhat divided on the second aspect as the extent to which they wished to distance themselves from advice, as illustrated by Lender 5's mixed feelings, who reported being "fearful about stepping into that void and doing something that is not our natural skill" but also that:

> *"We're expecting our staff, who might not necessarily have a passion or knowledge about it [energy efficiency], to speak with customers…. we need to be sure that we're not giving advice, but we can have informed conversations. And that was really important to us, to be able to do that and support our customers."*
>
> *Lender 5*

Related to these concerns was the role of third parties. Lenders felt that understanding and appreciation of green factors in other organisations in the supply chain can be a problem. For instance, they wondered if crucial players such as estate agents and valuers understand, and therefore price-in, energy efficiency impacts on housing values. For some lenders, the majority of mortgages come through intermediaries (brokers), from whom they thought "greenness" would not be considered an important factor. In terms of access to reliable contractors to perform energy efficiency installations, Trust Mark was the favoured solution. Although one expert raised concerns about having enough trained contractors, pointing out that accreditation can be costly for SMEs. As a result of this, many of the interviewees indicated a space for independent advice that they would like to see filled. The Green Finance Institute's Green Home Finance Principles, Building Renovation Passport, and demonstrator projects were mentioned several times – particularly in terms of the usefulness of having agreed principles to define a "green" loan (most often), advice, or even advice sharing (less frequently):

> *"We're very much behind the Building Renovation Passport idea that has been raised by the Green Finance Institute, and we would love that to come in, because that would really help us to understand the trajectory that the borrower is on. So we could have a more informed discussion with them."*
>
> *Lender 8*

---

[21] The Energy Technology List (ETL) is a government list of energy efficient plant and machinery. In order for a product to be listed, it must meet the ETL's robust energy saving criteria - typically set at the top 25% of products in the market.

Furthermore practical difficulties were also raised by both lenders and experts. Adding sources of "friction" in the form of additional time and steps for the customer to complete in relation to the green terms and conditions of the loan was held to be difficult, as the mortgage process is for customers is already "stressful…with loads of touchpoints" (Lender 2). Lenders also worried about the cost and time involved in adapting their embedded – and frequently complex - IT systems. One expert suggested that these adaptations could disproportionately penalise smaller lending institutions lacking depth of staff and infrastructure resource.

Overall, green lending products' combination of high effort, low margins, and low volume did not add up to a definitive business case. Stepping back and looking at the wider organisational context, a strategic imperative to act was also missing for some lenders. For instance, one lender noted their corporate commitment to Net Zero, but suggested that decarbonising higher carbon-intensity lending than residential property is more likely to be employed to meet this organisational priority:

> *"We think that, again back of the envelope, our footprint of emissions in mortgages is probably about 35 times lower than it would be in the energy sector, so it's a fairly material difference. So, we think we would probably get a bigger bang for buck by tackling energy first and mortgages later."*
>
> *Lender 6*

Nevertheless, lenders were aware that long term, if barriers could be addressed, there was "value in unlocking this market because there is a significant amount of finance that needs to be provided over the coming decades" (Lender 3) in order to meet UK's Net Zero objectives. This leads to the final selection of insights around future developments.

Perspectives on future developments

In the final section of the interviews, views on long term developments in the market were discussed. For instance, if MEES increased the required EPC level this could be a major shift, added to any requirement for portfolio EPC disclosure. Some lenders had concerns around inefficient properties becoming "stranded assets". Focussing on the absolute EPC rating, some suggested, could cause a two-tier market:

> *"You're going to end up with a load of people who are effectively going to become mortgage prisoners because you're not going to want that liability on your books and you could see it from a retention perspective, everybody is going to want to retain A, B, C rated properties. You might want to hive off your lower rated ones."*
>
> *Lender 2*

This theme of "mortgage prisoners" was raised in these precise terms in four separate interviews. One lender also observed that because retrofit cost is to a certain extent fixed, this would disproportionately hit less prosperous areas with a worse LTV. One lender suggested that taken to its logical extent, they would have to choose between optimising credit risk or "greenness" when evaluating long-term lending criteria. Instead, lenders preferred solution tended to be for an incentive to measure improvement in EPC ratings rather than the absolute end result.

As both lenders and experts felt that changing the efficiency of properties in the UK was not just a question of mortgage availability, some advocated the deployment of other financial mechanisms that might be more attractive to consumers, such as adjustments to stamp duty for energy efficient properties, or lower VAT rates on home efficiency improvements. The two market experts interviewed were particularly supportive of this, believing that mortgages are too slow and bureaucratic to create enough impetus for change. Moreover, mortgage lending was not deemed suitable for small-scale interventions:

> *"There may be solutions for customers, quick, easy wins that do not need mortgage finance. They might need some kind of finance, but mortgage finance over the long term can be expensive, more expensive than unsecured finance in the short term. For example, if someone is going to insulate their loft, I would very much guard against putting that on your mortgage."*
>
> *Lender 4*

There were suggestions from experts and lenders that grants are needed, especially for the fuel poor, or for those whom mortgage and stamp duty changes would not affect. There are sections of the population (one lender quotes 20%) who may struggle to meet lending credit checks, or whose property is not suitable for lending. Another lender suggested government subsidies to lending, such as an interest rate offset by which government funds the initial months of interest payments. Some disappointment around the demise of the Green Homes Grants was noted, as they were deemed a potential catalyst that had failed to gain traction.

A final message from the interviews was that lenders were unlikely to "do it on their own" (Lender 2), as large scale change needed other parties to act too. There was a desire for holistic planning, consistent policy, and common definitions. The latter linked very much to the expressed need for independent advice and reliable assurance of what is "green" and what is not, as also advocated by experts:

> *"A consistent and clear way to kind of mitigate greenwash concerns around, you know, labelling a product as green."*
>
> *Expert 1*

A roadmap for each property – such as the Building Renovation Passport – would be valuable – and could be complemented by training for installers to understand holistic solutions:

> *"There's very few installers, I think, that are able to have a proper end-to-end discussion with a customer as to, "This is your property; this is what you need to do in these orders to get from A to Z." All they're focused on is coming back with single measure sales."*
>
> *Lender 7*

However, there was felt to be a role for government, for example in regulating installation quality and improving assurance data, and in providing consistent standards for energy efficiency (such as a MEES extension for owner-occupiers). Government's role in the education of customers to counter the perceived lack of demand was often referred to:

> *"We can provide the finance. We can provide the finance today…But … – customers have to understand it and want to do it. Now we can play our part in that and have products, and have content on websites, and encourage, but it has to be halfway. We have to create the demand and satisfy it. We can satisfy it. I think the government have a real duty to create the demand."*

Lender 4

More generally, there was a hope that government could create the conditions to “normalise” the green mortgage market (Expert 2), by situating it in a wider landscape of other incentives pulling in the same direction, and through consistent policy signals. One lender described this as creating a “glide path” to Net Zero.

During the process of the interviews, it was notable that several lenders wanted or needed information on the topic of green lending and current activity in the UK market, and that indeed this was part of their enthusiasm for participating in the evaluation. Some were already conducting their own market research because they felt a gap existed in knowledge. Several mentioned that they did not know where to go for good data. Sharing “market intel”, the lenders remarked, is usually difficult between competitors, but could be explored here, in view of what they felt was a largely untested green market. As a result of this lack of data, lenders sometimes felt insecure about their own progress in the deployment of green products, and the assessment of their portfolios, and unclear about how they compared to others. This uncertainty is therefore in itself a barrier to further development.

Market Conditions

This section presents analysis on the potential market size for investment in energy efficiency in English households based on their existing mortgage holding and energy efficiency performance levels and expected costs. The aim of the analysis was to identify the existing financial conditions of English properties in terms of their existing financial conditions that help inform the potential lending conditions for green home financing. The analysis focused on loan and investment metrics for residential owner occupiers in England.

Method and approach

The approach used the 2018-19 English Housing Survey[22] as the basis for the analysis with a focus on owner occupiers. Although the survey is not designed to be representative of English mortgage owners, it has been developed to broadly represent the English housing stock and households therein. The analysis constructed a table of owner-occupiers and their corresponding energy performance levels, along with the values related to the cost of upgrading the home to a potential improved energy performance level as defined in the EHS.

Three different metrics were considered:

- Mortgage to asset value: the measure of the total outstanding mortgage value to the value of the home. This estimate is made by the homeowner during the EHS interview and is not specifically verified.
- EPC cost to mortgage value: The cost of the EPC calculated improvements over the total outstanding mortgage value. EPC improvement costs are based on the EHS post-interview analysis and using reduced standard assessment procedure (rdSAP) assumptions, which calculates the notional energy performance of UK dwellings.
- EPC cost to asset value: The cost of the EPC calculated improvements over the total estimated value of the homes.

The objective is to use the above metrics to characterize the market conditions that could impact on the potential for green home financing.

Findings

The analysis found that average mortgage for a typical owner-occupied dwelling is £56,000, while the average purchase price of a home is £140,740, however households believe that their house value is on average 34% higher at £214,460. This could be thought of as their expected sale price. (see Table 2.)

The market conditions show that there is a high level of borrowing among English households and that the mean mortgage to asset ratio is around 0.5 overall and across SAP bands (Table 1). Mortgage to asset ratio may be even higher depending on the market (see Figure 4).

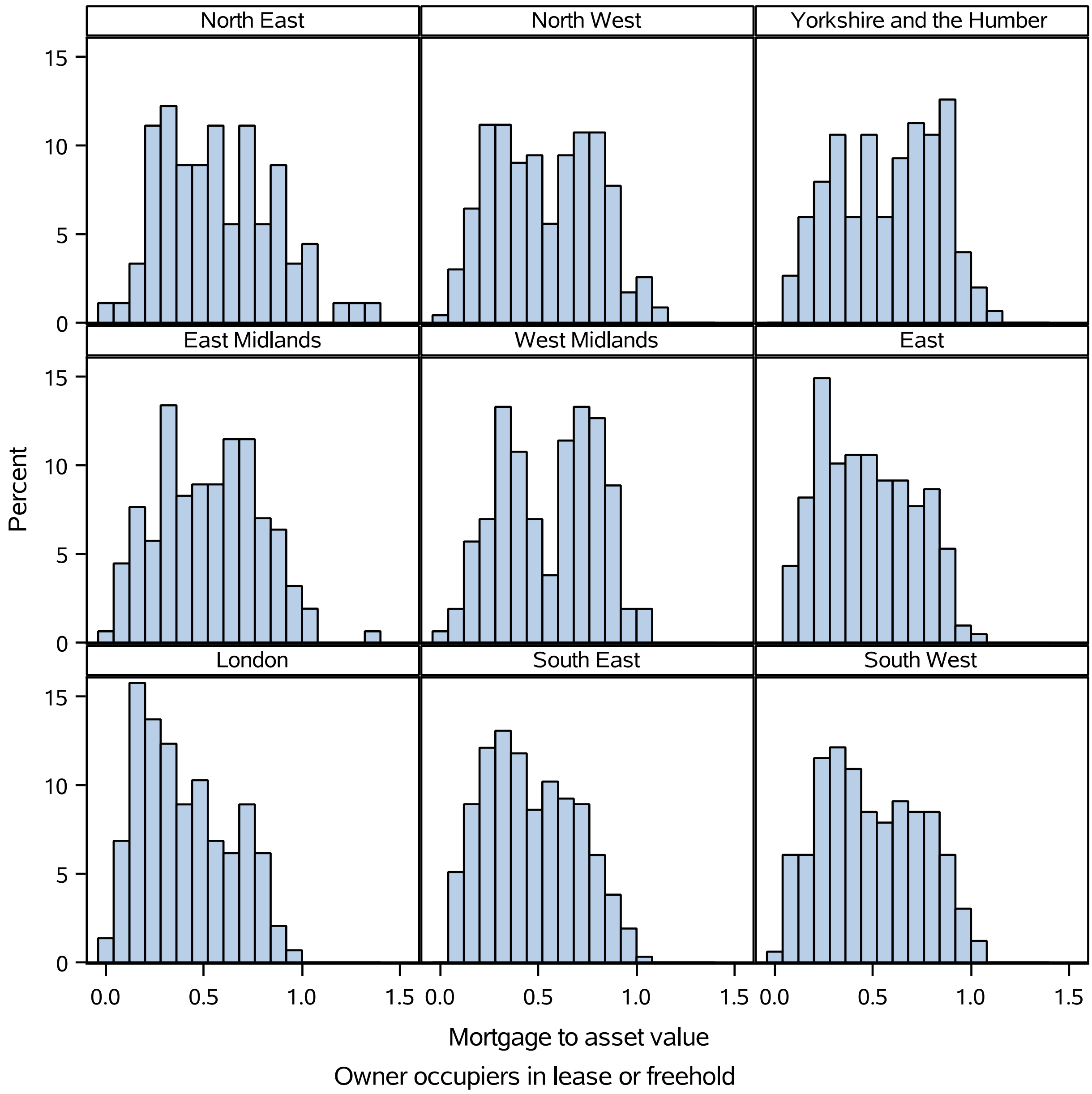
[22] A more recent EHS was made available after the commissioning of the SOTM. It is not anticipated that the more recent data is likely to show substantially different results. A subsequent update will be performed using the latest data.

The mortgage to asset ratio is a measure of the amount of borrowing of a home-owner for their property in the form of a mortgage over the value of the home. If a dwelling has a high mortgage to asset ratio, i.e. between 70-90%, then the potential for additional borrowing is potentially limited depending on the borrowers financial conditions. A highly leverage asset (i.e. high mortgage to asset value) would require high earnings or additional collateral for further borrowing. The implications are that additional borrowing for those above 0.7 may be limited as banks could see this as a risk if the borrower's ability to pay were affected.

Table 2 – Mortgage costs and dwelling value among owner occupied dwellings in England

Owner type	Energy efficiency rating band (SAP 2012)	Number	Current mortgage - original amount	Householder's view on property value	Mortgage to asset value
Freehold	B	12,676	£210,787	£474,577	0.48
	C	1,026,558	£128,224	£256,431	0.59
	D	2,338,311	£118,883	£273,278	0.5
	E	782,009	£132,472	£310,322	0.49
	F	109,005	£143,009	£377,904	0.41
	G	19,378	£123,841	£231,408	0.49
Leasehold	B	44,012	£95,360	£197,624	0.57
	C	238,383	£93,809	£202,934	0.56
	D	225,766	£119,057	£255,822	0.49
	E	47,161	£101,084	£216,137	0.55
	F	6,150	£43,589	£199,620	0.20

Figure 4 – Mortgage to asset value among owner occupied dwellings in England



The average cost of investing in improving the energy performance of the dwellings, according to the EHS, is around £16,300, which brings the average dwelling from an EPC D to an EPC B. The EPC improvement investment compared to mortgage costs are on average around 10% of the dwelling asset value. However, these vary considerably, from as low as 2% among EPC B dwellings, to around 12-14% among EPC E and F dwellings (Table 3). When considering the EPC investment to mortgage value, the range is much higher, with EPC D freehold owner-occupied dwellings being above 60%, but the average being around 40%.

The conditions for additional borrowing among English households may be constrained for those where mortgage to asset value is above 80%, this would imply addition risk and reduce the capacity of the borrower to take on more borrowing costs. The number of owner-occupied dwellings above 80% borrowing are estimated to be around 17% of the total market.

In addition, if the EPC costs to mortgage value is a significant amount, e.g. over 20%, this could imply a household may be unlikely or unwilling to take on more costs. Finally, the EPC cost to asset value could imply the potential for borrowing against built up capital. However, if the percentage is high, e.g. over 20% there is a higher risk that the required investment amount is too high to the asset value and therefore would be unable to recuperate its loan if the property were sold. In the instance of a high EPC cost to asset value it may also be the case that local housing conditions will not realize the investment asset value increase in resale and therefore place downward pressure on the market for investment.

The market conditions for lending to owner occupier households to improve the energy performance of their dwellings appear to be capable of absorbing additional loan costs. However, with the mean cost of improving dwellings from an average EPC D to B at almost £17,000 and around 10% of dwelling value is a considerable sum for many households and could add significantly to their borrowing costs.

Table 3 – Mortgage and EPC investment costs among owner occupied dwellings in England

Owner type	EPC	Number	Current mortgage	Householder's view on property value	Energy upgrade cost - all upgrades (£)	EPC loan to asset value	EPC loan to mortgage value	Pre-retro fit EPC	Post-retrof it EPC
Freehold	B	12,676	£210,787	£474,577	£6,198	0.02	0.05	82.09	86.77
	C	1,026,558	£128,224	£256,431	£12,112	0.08	0.17	72.94	84.39
	D	2,338,311	£118,883	£273,278	£17,055	0.09	0.68	63.15	81.33
	E	782,009	£132,472	£310,322	£23,282	0.12	0.34	51.56	80.79
	F	109,005	£143,009	£377,904	£26,032	0.1	0.3	38.17	76.97
	G	19,378	£123,841	£231,408	£24,116	0.13	0.32	27.4	68.59
Leasehold	B	44,012	£95,360	£197,624	£540	0.01	0.01	82.08	83.12
	C	238,383	£93,809	£202,934	£4,499	0.03	0.11	75.57	80.98
	D	225,766	£119,057	£255,822	£13,459	0.08	0.22	64.38	78.38
	E	47,161	£101,084	£216,137	£17,671	0.13	0.25	52.43	77.96
	F	6,150	£43,589	£199,620	£25,027	0.14	0.72	33.25	85.7
All		4,849,409	£122,148	£272,790	£16,296	0.09	0.44	63.4	81.59

Notes: Pre-retrofit EPC is the rdSAP level of the existing dwellings and denotes their current energy performance (with higher better). The post-retrofit EPC is the predicted rdSAP level following a notional retrofit.

State of the Market Review Appendix

Market Review Green lenders included in product review[23]

NatWest
Barclays
Saffron Building Society
Paragon Bank
Nationwide
The Mortgage Works
Virgin Money
Ecology Building Society
Newbury Building Society
Just Group
Kensington Mortgages
Foundation Home Loans
RBS
BNP Paribas
Monmouthshire Building Society
Halifax
Santander
Keystone Property Finance
LendInvest
Lloyds Bank
TSB
Landbay Partners Ltd
Dudley Building Society
Bank of Ireland
Principality Building Society
Legal & General Home Finance
Danske Bank
Pepper Money
Progressive Building Society
Melton Mowbray Building Society
Scottish Building Society
Tandem Money Ltd
AIB UK
Ulster Bank

[23] These lenders include all those apart of the product review. Lenders included in the interviews are not identified for purpose of anonymity.

Annex C: Research instruments for Phase 1

Internal Stakeholder Topic Guide

Instructions for interviewers

The interviewee has been selected as they are involved with the design, delivery and/or management of the GHFIF programme, or have been involved in the past. These include:

- BEIS policy (including SICE and EEL SROs)
- BEIS programme delivery team / programme managers
- Technical assessors
- Monitoring Officers

Prior to each interview, familiarise yourself with the interviewee's role and read the notes from the scoping interview if they have been interviewed previously and avoid any repetition in questions covered (follow ups on specific points can be revisited).

Background to the research to be shared with the interviewee

This interview forms part of an independent evaluation of the Green Home Finance Innovation Fund. Your comments in this interview will provide valuable insights to feed into Government's evaluation of this programme and have the potential to shape future Government policy in this space.

Consent

Thank you for agreeing to take part in this interview. As you know, BEIS has commissioned Technopolis Group, in collaboration with EREDA Consultants and IFF Research, to conduct an independent evaluation of the Green Home Finance Innovation Fund. This interview should last around 60 minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

- To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
- We will provide an anonymised version of this information and any analysis we carry out as part of the evaluation study with BEIS, for its own internal purposes only.
- BEIS expect to publish aggregate, unattributed results of the analysis of information from these interviews.

- We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation.

Are you happy for us to proceed?

Topic guide for interviews with GHFIF internal stakeholders

Section A: Background (all interviewees NOT covered during scoping study)

1. [for interviewees not interviewed during scoping study] Please could you give me a brief overview of your position and the nature of your engagement in the GHFIF programme?
2. [for interviewees interviewed during scoping study] I am aware your role in GHFIF was [describe role from the transcript]. Has this changed since?
    a. If so, does your current role relate to GHFIF?

Section B: Strengths of strategic case (all interviewees)

3. Why do lenders need public funding to develop and offer green products and services?
    a. What are the key barriers holding back private involvement in this area?
    b. How do these issues vary across different types of lenders? (Big 6 vs smaller lenders)
    c. How do these issues vary across different types of product?
    d. What commercialisation skills / experience relating to development and rollout of green home finance innovation do lenders tend to lack?
    e. Is the GHFIF sufficiently targeted at areas of need? (if not what is missing?)
4. How well does GHFIF align with Government policy objectives around clean growth and decarbonisation of homes?
    a. How were Government decarbonisation objectives considered in the design of the GHFIF?
    b. Since the programme was launched in 2019 what have been the most significant changes in regulation and/or policy that have influenced the landscape for green home finance innovation?
    c. What more could be done to align GHFIF with the direction of regulation and/or policy?
5. Are you aware of any other government interventions influencing development and rollout of green home finance products?
    a. What about international examples of policies targeting this development?

Section C: Business engagement and communication (incl. competition design) (BEIS programme delivery and policy teams involved in design decisions)

6. How was the competition scope defined?
    a. What consultation took place with private sector, academics, Innovate UK, other funders, policy colleagues to define the scope? What gaps were there in the types of stakeholder consulted?
    b. How were the eligibility criteria for the GHFIF programme developed? Were the eligibility criteria defined appropriately? Did they exclude potential participants that may have had a relevant innovation? Did they lead to bids being made from applicants that did not meet the aims of the programme?
    c. Were the eligibility criteria sufficiently clearly communicated in marketing and promotional materials?
    d. What could have been done to improve the way the GHFIF competition brief was developed?
7. Can you tell me about the communication and promotion strategy for GHFIF?
    a. Did the communication strategy reach the right audiences (groups of lenders)?
    b. What promotional activities (e.g. direct engagement, communications with corporate policy team, supplier day) were most and least effective?
    c. Was the quality of recruitment materials sufficient to attract potential applicants?
    d. Did the communication strategy generate sufficient interest to create a large pool of high quality proposals/applicants?
8. Were the number and range of attendees to the supplier day as expected?
    a. Were there any unexpected attendees?
    b. Were there any non-attendees that you had assumed would attend?
    c. Did any aspect of the programme attract a notably low or high level of interest?

Section D: Application and Assessment and Selection Process (Assessors and BEIS programme delivery)

9. How valuable was the Expression of Interest stage in supporting the delivery of the programme?
    a. Was the volume of EOIs received as anticipated?
    b. How useful was the EOI stage in filtering out ineligible proposals?
    c. Could the EOI process be adjusted to improve the efficiency of the programme delivery? How?
    d. Would there be benefits in extending the scope of the assessment to quality criteria alongside issues of eligibility?

10. What was the reason for three out of the 12 EOIs converted into a full stage proposal?
    a. Was the timeframe between EOI and full proposal stage long enough?
    b. Were any elements of eligibility detracting prospective applicants from submitting full bids?
11. How appropriate and relevant was the information asked for in application?
    a. To what degree did the application enable applicants to provide the detail needed to assess the merits of the innovation under development and the risks involved?
    b. Did the application provide sufficient evidence of the financial constraints facing the applicant (reasons for public funding), and the proposed business model to exploit the innovation?
    c. Did the application gather information needed to identify 'marginal projects' – i.e. those that would not have gone ahead without GHFIF-funding but had the economic/environmental potential?
    d. Were the resources required to complete the application proportionate to the level of support available to beneficiaries?
    e. Were any other sources of information (outside those submitted in the application form) required to make an assessment? What were these and how were they sourced?
    f. How could the design of the application form and accompanying guidance be improved to support better decision making?
12. What is your view on the overall quality of the applications received?
    a. How well did applicants understand the competition requirements and application process?
    b. Was sufficient information and advice about the competition and application process provided to potential applicants?
13. Was enough done to minimise submissions of low-quality bids? What aspects of the application process were designed to prevent low quality bids?
    a. Can you think of any other factors which could contribute to the underspend not previously discussed?
14. Was the assessment of full stage applications conducted efficiently and effectively?
    a. How were assessors selected or recruited? How were they assigned to applications? Were assessors assigned to projects based on their skills/experience? What improvements could be made to the assessor selection process?
    b. What guidance was issued to assessors prior to the assessment process? (Beyond assessor briefing slides) Was this sufficient to fully inform assessors of their responsibilities and the assessment process? Could the guidance be improved?

c. Do the assessors have the required skills/knowledge/experience to impartially assess applications? Were there any gaps in skills or expertise? Were there any difficulties with potential biases of technical assessors? How were these issues overcome?

d. Roughly how long did it take to assess and score an application? Were the timescales for assessment adequate to allow a robust assessment of all applications?

Section E: Programme monitoring

15. How effective are the processes used to monitor projects?

    a. What skills / knowledge do monitoring officers require? Have the monitoring officers used for the programme possessed the correct skills/knowledge? If not, what has been done to rectify the situation?

    b. How are monitoring officers assigned to projects? Are they matched on skills / areas of expertise? Availability / case load? Other factors?

    c. What resources are required to undertake monitoring? On average, how much time is required to monitor a project? Do monitoring officers have sufficient time to effectively monitor projects? Distinguish between monthly, quarterly and final reports and annual KPI collection.

    d. What input is required from participants? How is this information collected?

    e. How frequently do monitoring officers meet with the project staff? What assessments do the monitoring officers make during a meeting?

16. How do monitoring officers escalate issues with a project?

    a. How frequently are these steps used? Should they be used more frequently, and if so what is preventing monitoring officers from utilising these steps?

    b. Could failing projects be identified at an earlier stage? What changes would be required? Would this be a proportionate effort given the size of the projects / likelihood of early closure?

17. How effective is the data collection processes at project completion?

    a. How aligned are the different mechanisms to collect data from projects? Is there any duplication in efforts between data collection activities? E.g., monthly, quarterly monitoring, annual KPI data collection, final reporting?

18. What is your view on the overall quality of support available to meet project needs?

    a. Can you tell me if and how the programme supports the applicants beyond financial support?

    b. Is the support proportionate to the scale of the programme? Do businesses have ample engagement?

Section F: Policy lessons and spill-overs (BEIS programme delivery, policy leads)

19. How are findings from projects disseminated upon completion?
    a. How does the programme balance commercial confidentiality with potential knowledge spillovers?
20. What mechanisms are in place for GHFIF projects to inform Government policies?
    a. How is learning from ongoing and completed projects fed back into the wider policy cycle? Who is involved in feeding back learning? Monitoring Officers, lenders, BEIS?
    b. What type of information / data is needed to support policy changes? Is this already being collected as a part of GHFIF? (e.g. through monitoring reports)
    c. How are projects/milestones within them identified as possible candidates to inform government policies? Whose responsibility is it?
    d. What more could be done to codify and disseminate the policy lessons arising from GHFIF projects?

Section G: Final reflections (all interviewees)

21. If you were designing GHFIF from scratch:
    a. What key aspects of programme design would you keep?
    b. What one aspect would you remove, if any?
    c. What one aspect would change or add?
    d. Are there any other points that you would like to raise?

Section H: Interview close (all interviewees)

Request permission to-recontact interviewee to clarify information and note that we may be in touch in spring 2022 for a follow-up interview.

Thank you and close.

Competition Winner Topic Guide

Instructions for interviewers

The interviewee has been selected as they are involved in the delivery of one of the GHFIF projects (either as a lead or a partner).

Prior to each interview, familiarise yourself with the interviewee's role and read the notes from the scoping interview if they have been interviewed previously and avoid any repetition in questions covered (follow ups on specific points can be revisited).

Background to the research to be shared with the interviewee

This interview forms part of an independent evaluation of the Green Home Finance Innovation Fund. Your comments in this interview will provide valuable insights to feed into Government's evaluation of this programme and have the potential to shape future Government policy in this space.

Consent

Thank you for agreeing to take part in this interview. As you know, BEIS has commissioned Technopolis Group, in collaboration with EREDA Consultants and IFF Research, to conduct an independent evaluation of the Green Home Finance Innovation Fund. This interview should last around 60 minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

- To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
- We will provide an anonymised version of this information and any analysis we carry out as part of the evaluation study with BEIS, for its own internal purposes only.
- BEIS expect to publish aggregate, unattributed results of the analysis of information from these interviews.
- We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation.

Are you happy for us to proceed?

Topic guide for interviews with Project partners

Section A: Background (all interviewees NOT covered during scoping study)

1. Please confirm your role and your level of involvement in the GHFIF.
2. Has your role changed throughout the programme?

Section B: Strengths of strategic case (all interviewees)

3. Why do lenders need public innovation funding support to develop and offer green products and services?
    a. What are the key barriers holding back private involvement in this area?
    b. How do these issues vary across different types of consumer segments and what are the key barriers to uptake to overcome?
    c. What commercialisation skills / experience relating to development and rollout of green home finance innovation do lenders tend to lack?
    d. Is the GHFIF sufficiently targeted at areas of need? (if not what is missing?)
    e. Probe for complexity of products, customer segmentation, verification/quality assurance of installations, supply chain capability, funding for consumer advice/guidance etc.
4. Are there any other government policies or interventions that are affecting your plans around Green Finance for homes?
    a. How well does GHFIF align with these policies and interventions?
    b. Have you applied for any other similar government programmes or schemes? Why/why not?

Section C: Business engagement and communication (incl. competition design)

5. Thinking back to the time before you submitted the GHFIF application:
    a. How did you find out about the GHFIF?
    b. Did you attend the supplier day in July 2019?
    c. Did you find the supplier day clear and informative?
6. How clear was your understanding of the needs and objectives of the GHFIF programme?
7. How could initial engagement and communication activities have been improved by BEIS?
8. What feature of GHFIF attracted you the most?
    a. Probe for: level of funding available, alignment of objectives, perceived ability to win, ease of application. If project leads can't remember back this far then probe this question more generally by asking What do you look for in this kind of competition, what do you find off-putting about government competitions?

Section D: Application and Assessment and Selection Process (Assessors and BEIS programme delivery)

NB. The following questions are highly specific to GHFIF and we are aware that interviewees may not recall or know about every element. However, in this case we would like you to be prepared to reframe the question to a more general probe so that we can gain general insight about how lenders respond to government innovation competitions. E.g. if they can't remember how the GHFIF proposal came about then ask them about how proposals of this nature arise in general.

9. Can you tell me about preparing how your proposal came about?
    a. How developed was the idea at the time of call for proposals?
10. Thinking back to the Expression of Interest stage of the proposal:
    a. Was the timeframe for submission sufficient?
    b. Were the costs incurred in the EOI assessment proportionate?
    c. How much resource was required to prepare the EOI?
11. Thinking back to the full proposal:
    a. Did you have sufficient time to prepare the proposal?
    b. Did you find the information requested in the application relevant to your project?
    c. How much resource was required to prepare the proposal?
    d. Were these costs related to the costs of the preparation of the proposal proportionate to the perceived benefits that you would gain from taking part in the competition?
12. In hindsight, are there ways that you think the application and assessment process could have been improved or streamlined in any way?
13. Are there any other aspects of the application process that you feel may have deterred eligible firms in your sector from applying? Probe for:
    a. Budget
    b. Timescales
    c. Commercially sensitive information
    d. Lack of interest in the sector
    e. Perception of government schemes

Section E: Programme monitoring

14. How far would you say that you have had sufficient support and guidance since your appointment to the programme?
    a. Are there any areas where you feel support could be improved, or where additional support is needed?

15. Did you encounter any challenges in undertaking the project?
    a. How did / does your Monitoring Officer help you respond to these challenges? Did they provide sufficient support throughout project delivery?
16. Did the monitoring officers have the required skills to effectively deliver their role?
    a. What skill gaps were there if any?
17. How did the monitoring and reporting requirements for BEIS compare to your expectations? What was required? Was it proportionate?
    a. Did the various reporting requirements complement one another? Probe around: monthly, quarterly, final reports and KPIs
    b. Have the monitoring requirements evolved over the lifecycle of the programme (was monthly reporting discontinued in Summer 2020?)
18. Thinking of the monitoring processes of GHFIF projects, can you think of any ways in which these could be improved? Probe for:
    a. Streamlining / reducing specific requirements while retaining sufficient oversight.

Section F: Policy lessons and spill-overs (BEIS programme delivery, policy leads)

19. How are findings from projects disseminated upon completion?
    a. How does the programme balance commercial confidentiality with potential knowledge spillovers?
    b. If projects generate public goods, how are these shared/promoted?
20. What mechanisms are in place for GHFIF projects to inform Government policies?
    a. How is learning from ongoing and completed projects fed back into the wider policy cycle? Who is involved in feeding back learning? Monitoring Officers, Delivery Partners, BEIS, project staff?
    b. Are the mechanisms formal or informal?
    c. What type of information / data is needed to support policy changes? Do GHFIF processes already collect this information as standard, or are additional resources required to collect this information?
    d. What weight is given to information provided by the GHFIF programme? Can you provide examples of where results of GHFIF projects have influenced Government policy?
    e. What more could be done to codify and disseminate the policy lessons arising from GHFIF projects?
21. If you were designing GHFIF from scratch:
    a. What key aspects of programme design would you keep?
    b. What one aspect would you remove, if any?

    c. What one aspect would change or add?

22. Are there any other points that you would like to raise?

Section G: Project progress update

23. Can you please give a brief overview where your project is within its delivery timeline?
    a. Completed? If not what is the next milestone?
24. What would you say have been your project's key achievements to date?
    a. What have been the main barriers to the delivery of your project apart from Covid? Probe for technology development, marketing, customer takeup, other admin?
25. We're aware of delays of projects due to Covid 19, has the scope or focus of your GHFIF activities changed since project inception?
    a. Reduced scope? Revised scope? If so, what have been the factors behind this?

Section H: Interview close

Request permission to-recontact interviewee to clarify information and note that we may be in touch in spring 2022 for a follow-up interview.

Thank you and close.

Market Experts Topic guide

We would like to talk to you about your experience of the development of green lending for the home retrofit market.

This interview forms part of an independent evaluation of the Green Home Finance Innovation Fund. Your comments in this interview will provide valuable insights to feed into Government's evaluation of this programme and have the potential to shape future Government policy in this space.

Consent

Thank you for agreeing to take part in this interview. As you know, BEIS has commissioned Technopolis Group, in collaboration with EREDA Consultants and IFF Research to conduct an independent evaluation of the Green Home Finance Innovation Fund. This interview should last around 60 minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

- To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
- We will provide an anonymised version of this information and any analysis we carry out as part of the evaluation study with BEIS, for its own internal purposes only.
- BEIS expect to publish aggregate, unattributed results of the analysis of information from these interviews.
- We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation. Are you happy for us to proceed?

Topic guide for interviews Market experts

Section A: Introduction

1. Could you explain a bit more about what does your organisation does?
2. Could you explain your role within the organisation, and how it relates to green lending for the home-occupier market?

Section B: Current market for green loan products

3. What types of green finance products are you aware of being currently offered to homeowners (and/or private domestic landlords) for energy efficiency improvements or energy efficient properties across the market in general?
    a. How are these products distinct from the equivalent standard offerings?
    b. Are these products more accessible to customers than the equivalent standard offerings?
4. Do you know what the motivations are behind this development?
    a. Prompt for different types of driver (business case, market changes, policy national/international, prices)
5. Are there particular lending organisations who are more likely to either develop these – or not to develop them – and if so, why?
    a. Are there trends on size, access to capital, consumer base?
    b. How have you seen third party organisations being involved in current product development with lenders?

Section C: Reflecting on current green loan products

6. Do you know how the energy performance of “green” vs standard loans is evaluated?
    a. How is assurance undertaken (if at all?) (Probe for: site visits, receipts, smart meter data, external audits?)
    b. Are EE installer supply chains involved in this assurance?
    c. What types of data are used to assess this?
    d. What systems and definitions exist to record them?
7. Are you aware of any evidence around the financial performance of “green” vs standard loans?
    a. Do they tend to perform better or worse than standard equivalent debt products? (e.g. property values, default rates)
8. Are you aware of any unsuccessful products which were pulled?
    a. What were they?
    b. Do you know why did these not work?

Section D: Future development

9. What do you think will encourage the development of more green mortgages or loans in the future?
    a. What is driving this?
    b. (Prompt for: competitors, customer interest, policy/regulation, investors, energy prices, property values, business opportunity)
10. What might be needed to develop these sorts of products?
    a. (Prompt for energy technology installers, other partners, skills, knowledge, incentives/financial support, regulation, infrastructure/IT)
11. Do you see any potential for stronger market segmentation reflecting energy efficiency? (e.g. “green premium” on property values, penalties for lower performing stock, pressure on loan portfolio and divestment?)

Final reflections

12. How have you seen the market for green home finance change/develop over recent years?
    a. When did you see this market accelerate?
    b. Are there notable milestones you remember?
13. What do you think will be the major opportunities and challenges going forward in the short term to deliver the UK’s commitment to decarbonizing buildings?

Interview close

Thank the interviewee for taking part.

Indicate that we might wish to come back to you, or your organisation, for a follow up later in the evaluation process, most probably in Summer 2022.

Non-applicant and Unsuccessful Applicant Topic Guide

Instructions for interviewers

The interviewee has been selected as they were invited to the supplier day at the launch of the GHFIF in July 2019.

Prior to each interview, familiarise yourself with the interviewee's role and read the notes from the scoping interview if they have been interviewed previously and avoid any repetition in questions covered (follow ups on specific points can be revisited).

Background to the research to be shared with the interviewee

We would like to talk to you about your experience of the development of green lending for the owner-occupier retrofit market. This interview forms part of an independent evaluation of the Green Home Finance Innovation Fund. Your comments in this interview will provide valuable insights to feed into Government's evaluation of this programme and have the potential to shape future Government policy in this space.

Consent

Thank you for agreeing to take part in this interview. As you know, BEIS has commissioned Technopolis Group, in collaboration with EREDA Consultants and IFF Research, to conduct an independent evaluation of the Green Home Finance Innovation Fund. This interview should last around 60 minutes. Your participation in this interview is voluntary and you can change your mind at any time. The information that you provide will be treated in confidence by the evaluation team.

We would like to use your inputs and request your permission for the following:

- To use the feedback you provide, together with any additional information you choose to disclose ("Information") for the evaluation study.
- We will provide an anonymised version of this information and any analysis we carry out as part of the evaluation study with BEIS, for its own internal purposes only.
- BEIS expect to publish aggregate, unattributed results of the analysis of information from these interviews.

We would like to record the discussion for analysis purposes, which will be used to help us accurately collect findings for the research. The recordings will be securely stored and retained by us and destroyed after the completion of the evaluation.

Are you happy for us to proceed?

Topic guide for interviews with non-applicants/unsuccessful applicants

Section A: Introduction and awareness of GHFIF

1. Could you explain your role within your organisation?
2. How are you personally involved with green home lending products in your organisation?
3. Are you aware of government's priority to stimulate lending for green home improvement in the owner-occupier market?

Routing: if No, go to Q6, if Yes go to Q4.

4. If yes, did you consider applying for funding under the BEIS competition for Green Home Finance Innovation Fund? [check if a colleague of the interviewee was invited to the supplier day on 15th July 2018]
5. If no, why did you decide not to take part?
    a. Timeframe for submission of proposals,
    b. Eligibility criteria / other detail in application guidance document – explore which ones.
    c. Other factors
6. How could the programme have been more attractive for you to consider submitting a full application?

Section B: Current green loan products

7. Does your organisation currently offer green finance products to homeowners for energy efficiency improvements or energy efficient properties?

Routing: If No, go to Section E. If Yes, go to Q8.

8. When did you introduce these products and why where these products introduced?
9. What types of products are these?
    a. Probe for:
    b. whether linked to mortgage. Or other form of loan, and whether or not secured against property?
    c. for the level of complexity, whether the product is embedded in a consumer journey which involves other work by the lender, or participation by non-lenders involved in the GHF-EE value chain?
    d. Is any EE advice offered to customers?
    e. Do you support the customer in selecting the most appropriate measures for their property or signposts them towards trusted advice elsewhere?
    f. Note to interviewer: Request documentation if available.
10. How are these products distinct from the equivalent "standard" offerings?

   a. Are energy efficiency bill savings considered as a part of the eligibility of the product? If so how does this affect applications if at all? Do potential energy efficiency savings inform the performance of product?

11. What was the main motivation/rationale for developing these products?
12. What was the rationale for not increasing the ambition/complexity/hardness to reach of these products?

   a. Probe for: going above and beyond low value cashback rewards, targeting lower EPC rated properties, targeting customers with unsecured lending products, offering additional advice (beyond a few paragraphs on the website), developing verification methods.

   Note to interviewer: Prompts to consider in this section: market demand positioning; customer profile or needs; financial rationale - including payback differentials/debt coverage, anticipated default rates, loan-to-value ratios; data; availability of delivery partners.

Section C: Thinking about customers

13. What types of customer / customer criteria are the products aimed at?

   a. Probe for the ‘why’ here. Why are some customer types and criteria seen as viable and other not?

14. Thinking about the customer journey:

   a. When and how are customers engaged?
   b. Which customers are immediately not targeted or seen as not viable customers for GHF products? Why?
   c. Can you describe how the customer would progress, and the timeframe for this? Probe for: initial advice sessions, methods for keeping customers engaged, any struggles or ‘drop-off’ points where customers tend to stop pursuing these products?
   d. Approximately what proportion of customers who expressed interest in the product(s) actually took it up? What are their thoughts on why?
   e. What does a typical customer taking up the product look like? (Average income bracket, age etc.?)
   f. Do you know why prospective customers might not take up the product(s) initially, or fail to complete?

Section D: Reflecting on current green loan products

15. What sort of challenges did you encounter in originally developing these products? (distinguish between internal and external challenges if possible)
16. What sort of challenges did you encounter in deploying these products?
17. What has been the level of take up?

   a. Will you be altering your product at all to increase take-up? If so, how/why? What types of energy efficiency are most commonly taken up by customers through these products? (e.g. low carbon heating, insulation for attics, walls, glazing)

   b. Did you reconsider or withdraw any products, and if so, why?

18. What third parties did you work with, on the development or deployment?

19. Were you able to verify or assure the energy outcomes?

Section E: Future development

20. [for interviewees answering No to Q5]: Do you have plans to develop green mortgages or loans in the future? / [for interviewees answering Yes to Q5]: Do you have plans to develop more green mortgages or loans in the future? And/or Do you have plans to develop on your current offering by increasing its complexity, size, additional advice, verification etc?

Routing: if Yes:

   a. What is driving this development? (Opportunities or risk management)

   b. (Prompt for: competitors, customer interest, policy/regulation, investors, energy prices, property values, climate risk)

Routing: if No:

   c. What are the main reasons for not pursuing these?

21. Have you thought of introducing other types of products such penalties for poorly performing energy efficient homes? (“brown” loans)

Section F: Final reflections

22. How have you seen the market for green home finance develop over recent years?

23. What do you think will be the major opportunities and challenges going forward in the short term?

24. Where do you see Government support having the greatest role in supporting development of green finance products? (incl. finance/regulation or any other forms of market intervention)

Section G: Interview close

Thank the interviewee for taking part.

As you were aware of the GHFIF, the evaluation team might wish to come back to you, or a colleague in your organisation, for a follow up later in the evaluation process. Would you be willing to do so?

This publication is available from: www.gov.uk/government/organisations/department-for-energy-security-and-net-zero