KAMMA

Green Home Finance Accelerator Discover Phase - Evidence Report: Green Homes Optimiser led by Kamma

October 2023

kammadata.com

KAMMA

Contents

Disclaimer

The views and opinions expressed in this report are those of the authors and do not necessarily reflect the official policy or position of the government. The information in this report is provided for informational purposes only and should not be construed as an independent review of the project.

1 Executive Summary

1.1 Introduction

Kamma's mission is to drive the built environment to net zero as quickly and cost effectively as possible. Inadequate data is leading to the creation of unattractive business cases for retrofit and home upgrades threatening that mission. Many domestic property owners (customers) believe that they cannot afford to upgrade the energy efficiency of their home because the associated benefits and available green financing products are not understood. Compounding this is the challenge in deciding on a retrofit package and provider.

The Green Homes Optimiser (GHO) project aimed to create a data-driven engine for an end-to-end retrofit platform connecting lenders, customers, and retrofitters. The overarching objective of the project is to allow customers to analyse their property and develop a retrofit plan aligned with their energy performance objectives and budgets.

The GHO project cost was £307,956 and the DESNZ grant contribution was £200,000.

1.2 Consumer retrofit adoption barriers

The key consumer retrofit adoption barriers and challenges identified were:

Retrofit finance - rising energy costs create a strong rationale for energy efficient and low carbon heating upgrades. However, domestic property owners often misinterpret retrofitting as a costly upfront expense, leading to the misconception that it's unaffordable.

Retrofit data - outdated, inaccurate, and incomplete data hinders retrofit analysis, making options unattractive for customers.

Retrofit providers - customers struggle to find and engage trustworthy retrofit providers. Technology can streamline this process, reducing the need for costly on-site consultancy.

Customer education/awareness - providing an easy to engage tool that brings customers through home retrofit options appropriate for their individual home, outlining relevant information to support decision making.

How the GHO project aims to overcome these barriers

The GHO project aims to overcome the retrofit adoption barriers, outlined above, by:

Convincing customers of the benefit of retrofitting - the central challenge in the GHO project is changing homeowners' perceptions about retrofitting by addressing misconceptions about its cost and disruption. Many believe it requires a significant upfront investment, and they lack awareness of available financial incentives.

Confidence in providers - the GHO will offer custom retrofit analysis, financial product evaluation, and connect users with trusted local retrofitters. Users will review providers and share feedback to build confidence.

Lender engagement - engaging and making lenders aware of the benefits of offering green financing products. Collaborating with our lender project partners and Kamma's wider customer base enabled us to understand their needs and priorities in relation to green finance.

Creation of appropriate green finance products - it is essential that appropriate products can be configured to meet customer retrofit needs to ensure uptake of retrofit measures.

Retrofit provider engagement - in order to complete the retrofit works, customers need to be easily able to connect with providers. We worked with British Gas to leverage existing connections to gain access to as many providers as possible running workshops and research with them to understand their priorities and blockers in the retrofit space.

1.3 Key consumer research findings

Kamma conducted research on consumer attitudes to green homes and retrofits in the UK for the purpose of understanding the best ways to create retrofit packages for UK homes in the GHO. The primary research methods and channels included desk-based research, four focus groups, circa ten individual interviews and mass surveys to thousands of people. These were chosen as an optimum blend of qualitative and quantitative methods giving the broadest most robust insight into consumer behaviour and needs.

The results of the research show that consumers are concerned about the impact of energy use on their daily lives and are actively looking for ways to reduce their energy consumption. Our research demonstrated that the path to achieve this varied quite substantially within the broad church of UK property owning stakeholders, and therefore nuance and optionality would be required to be built into the platform to serve myriad needs.

1.4 Key lender and retrofit industry research findings

We subsequently conducted research (desk-based plus two focus groups and circa six interviews) on the needs of lenders. The objective was to understand what challenges and blockers exist currently when it comes to lending against retrofit work. The ultimate objective across both research phases was to understand how to drive a revolution in retrofitting in UK housing stock, by understanding motivation to act.

Through discussions with lenders and suppliers, we have identified the importance of features beyond the GHO, such as mortgage book analysis and efficient decision-making and optimisation data tools. This empowers lenders, energy companies and retrofit suppliers to maximise their impact and contribute to significant energy efficiency improvements, whether at a large geographic scale or in managing portfolios of properties.

1.5 Learnings and reflections for future improvements

Our primary learning and reflections on the GHO discovery phase are:

Problem Understanding: It is crucial to test your hypotheses with an open mind rather than searching to prove your assumptions and gather insights from various stakeholders to gain a comprehensive understanding of the problem. It is key to broaden research channels while resisting guiding stakeholders to answers you want to hear; this will lead to the build trap.

Iterative Approach: Engage stakeholders in discussions, workshops, and feedback loops to continuously refine your solutions. Being able to increase the speed at which you can test, iterate and retest is crucial for any discovery project. Feedback loops enable continuous flow of information from stakeholders, helping to adjust project course.

Data-Driven Insights: While running workshops and interviews to gather qualitative information is important, it employs a small cohort introducing sample size risk. Collecting and analysing data is therefore critical to informed decisions.

Deeper Market Analysis: While our Discovery Phase was timebound, more in-depth market analysis could have helped. A comprehensive competitive analysis, including specific features, could help us see how users compared our offerings to those of competitors.

Appreciation of Partner Business Cultures: Our faster pace as a small, agile tech company occasionally clashed with the slower processes of our larger, often regulated partners. This was expected, given the differences in organisational structures. To address this, we should have allocated more time when partner input was necessary to accommodate their pace.

1.6 Key outcomes achieved

The key outcomes of the GHO project during the Discovery Phase were:

Product Design Decisions: Customer and stakeholder insights were used to inform critical product design decisions. This led to the creation of a design for a user-centric platform built on deep understanding of all parties needed for GHO success.

Strengthened and New Partnerships: Our collaboration with project partners, including major lenders and British Gas, has strengthened our relationships. During the project, we expanded outreach to include other industry stakeholders, fostering new partnerships and interest in the banking and retrofit sectors. These partnerships will be crucial for advancing the project, facilitating connectivity with green finance products, and retrofit providers.

GHO Minimum Viable Product Build: The GHO project achieved two significant build and test milestones, delivering tangible results beyond in-depth industry research. A modern software development standard was employed, providing a flexible infrastructure for the marketplace's future engine.

2 Evidence Report

2.1 Introduction

This project, the Green Homes Optimiser (GHO), aimed to create the data-driven engine for the first online end-to-end retrofit platform connecting lenders, customers and retrofit providers. The GHO project cost was £307,956 and the Department for Energy Security and Net Zero grant contribution was £200,000. The GHO was aimed to enable:

- lenders to create a data driven suite of green finance products which can be matched to customer retrofit needs.
- customers to analyse their property and develop a retrofit plan aligned with their energy performance objectives and budgets and use this to select a green finance product that meets their needs.
- creation of a clear and compelling business case for retrofit to individual customers to increase customer confidence and retrofit uptake.
- customers to connect with approved retrofitters and lenders to undertake and verify completion of upgrade work.
- tracking and benchmarking of retrofit and net zero progress nationally.

The project consortium collaborated to create a comprehensive platform for driving energy efficiency upgrades in UK properties. To achieve this, we undertook the following key development activities as part of the discovery phase:

- Use Kamma's national data and insights, combined with analysis of 4 lenders' mortgage books to develop optimum green financing products aimed at maximising impact and uptake across diverse customer profiles.
- Develop our data and insights engine to allow the creation of a "business case" for retrofitting, this considered impact on property value, fuel bills, and carbon emissions. A key aspect of this phase of work was testing with customers and optimising the analysis and reporting of data to maximise uptake and action.
- Carry out research with British Gas on opening the platform to retrofit providers including investigating how verification and validation could be incorporated. We connected directly with the industry to gain insights on the challenges and opportunities they experience.
- Investigate provision of a feedback loop for customers to register when work is complete and resulting energy efficiency rating so that current data can be constantly fed into stakeholder organisations to benchmark progress and inform decisions to ensure we are on track for net zero.

2.2 Addressing consumer barriers to the uptake of retrofit

The GHO addresses consumer barriers to the uptake of domestic energy efficiency and retrofit measures while incentivising homeowners to embrace these improvements in several ways:

- **Customised Retrofit Recommendations:** GHO provides homeowners with tailored retrofit recommendations based on their specific property characteristics, energy performance goals, and budgets. By offering personalised solutions, it overcomes the barrier of complex decision-making and empowers homeowners to make informed choices.
- **Cost-Benefit Analysis:** The platform conducts a comprehensive cost-benefit analysis for each retrofit measure, including the potential impact on fuel savings, home value, payback period, and mortgage rate reduction. This clear and compelling business case demonstrates the financial advantages of retrofitting, addressing the barrier of perceived unaffordability.
- **Access to Green Financing:** GHO will connect homeowners to a suite of green financing products offered by lenders. These financial options allow homeowners to spread the cost of retrofitting over time, making it more affordable and accessible. The platform addresses the barrier of financial constraints by providing clear pathways to financing.
- **Verification and Trusted Providers:** GHO offers homeowners access to verified retrofit providers, fostering trust in the supply chain. Homeowners can confidently select qualified providers to carry out the retrofit work. This addresses the barrier of trust in retrofit providers and streamlines the process.
- **Data-Driven Progress Tracking:** The platform enables homeowners to track and benchmark their retrofit and net-zero progress over time. This encourages continuous action and motivates homeowners by visualising their journey towards energy efficiency. It also addresses the lack of awareness and education by providing real-time feedback on progress.
- **Industry Collaboration:** GHO collaborates with lenders, retrofit providers, and industry stakeholders, creating a comprehensive platform that brings together all relevant parties. This collaborative approach fosters industry alignment, streamlining the process and making it easier for homeowners to access solutions.

By offering a user-friendly platform that addresses individual barriers, provides clear financial incentives, and collaborates with key industry players, the GHO aims to remove the hurdles preventing homeowners from embracing energy efficiency and retrofit measures. It empowers homeowners to make informed decisions, access financing, and confidently proceed with retrofit projects, ultimately driving the uptake of domestic energy efficiency and low carbon heating solutions.

2.3 Consumer research

2.3.1 Background and objectives

Kamma conducted UK based research to better understand consumer attitudes toward green homes and retrofits, aiming to optimise the creation of retrofit packages within the GHO platform. Our research methods included desk-based research, focus groups, individual interviews, and mass surveys, combining qualitative and quantitative approaches to gain a comprehensive insight into consumer behaviour and needs.

The research findings revealed a strong concern among consumers about the impact of energy consumption on their daily lives, coupled with a proactive desire to reduce their energy usage.

The primary goal of the GHO is to facilitate a substantial number of home retrofits across the UK. Our research highlighted significant variations in approaches among property owning stakeholders, whether owner occupier or Private Rented Sector landlords, emphasising the necessity for the platform to be adaptable and nuanced to cater to diverse needs within this broad category.

2.3.2 Personas, needs and challenges

As this variation became clear, personas were built to capture this diversity in a vibrant accessible format that can be easily grasped across the many Kamma teams contributing to the build. We then ranked the personas based on their overall importance to the GHO's goal, the ease of influence, and an estimate of the total number of UK homes that each applies to each. The top three are:

- Elizabeth - Busy Homeowner is ranked first with an estimated 5.09 million UK homes.
- Kevin - Professional Landlord is second with 4.73 million homes.
- Gene - Uninterested Homeowner is third with 3.23 million homes.

The sum of homes falling into each persona and therefore the total number of homes to influence is estimated at 20.99 million.

2.3.3 Jobs-to-be-Done

Based on this real-world input, we devised Jobs-to-be-Done outlining the main objectives that various users are trying to achieve.

For Professional Landlords the core jobs-to be done are:

- Maintain a sustainable (long-term) business.

For Owner Occupiers, the core jobs-to-be-done are:

- Increase home comfort.
- Reduce home related living costs.
- Make money from my home.

2.3.4 Key research findings

The key research findings ranked according to:

- The number of UK properties influenced by the persona.
- A 0-5 score for how easily the persona could be influenced by addressing the need.
- A 1 or 0 score depending on whether the need assists with any of the 4 core Jobs-to-be-Done.

Based on this methodology, the following table gives the overall priority ranking of user needs, with a logical description for the top 10 priority needs describing why they are important priorities.

Need	Score	Reason for priority
I want to increase the valuation of my home/property(s)	60.71	This applies to all personas except for struggling tenants. It would also be very compelling to promote retrofit work.
I want to find available retrofit specialists to start the work	55.48	Almost all personas, are not currently connected with retrofit professionals and would struggle to find them. It would help turn retrofit packages into reality.
I want to reduce the energy bills	55.23	During a cost-of-living crisis, and the fact that many homeowners are struggling to make ends meet, this will be a crucial metric and goal for deciding whether to proceed with retrofit work
I don't want to miss financial opportunities that will pay for improving my home/property(s)	54.61	Most people are very uncertain about where the funds would come from for retrofit work, and do not understand whether preferential rates or public schemes apply to them. Having all private and public funding options in one place at the point of viewing a retrofit package will act as a catalyst for action.
Considering all improvements already completed, I want to know what I should do next	52.07	If a homeowner has carried out improvements or changes since the last EPC assessment was carried out, a tool that takes those changes into account and gives a more accurate starting point would be more widely adopted.

I want to know what is possible to achieve within a constrained budget	51.42	People have limited access to funds, or often they simply have an appetite to spend up to a certain amount of money. Our survey responses suggest that budget appetite is wide and varying.
I want to learn more about retrofit measures before taking action	50.87	Education about retrofit measures is useful. If a tool talks to the end user in their own language with sensitivity to their situation, then more people will be engaged with the process.
I want to know which items to do first	49.86	The best recommendation would follow industry best practice, which we've discovered through our research that not many people are familiar with. They need a helping hand to make the right decisions.
I want to customise retrofit work based on personal preference	47.07	People have told us through our research that they have an aversion to certain retrofit products, for example that heat pumps look ugly. Likewise, not everyone is happy with the aesthetic of having solar panels on their roof.
I want to find guidance quickly and based on minimum input	45.51	Our research highlighted that lots of people don't know much about the attributes of their properties. For example, they wouldn't want to input the type of walls, or very specific information about the heating system in the property.

2.3.5 Initial criteria for POC

Based on the research findings distilled into Jobs-to-be-Done as outlined above and the prioritisation of needs, we built a journey flow for the Proof of Concept (POC) for the GHO. This includes steps such as searching for an address, adjusting property information, choosing goals and targets, and editing the retrofit package.

2.3.6 Conclusion

The research has been invaluable in supporting some of our hypotheses while challenging others and raising new user challenges and requirements that have been built into our design architecture. The most valuable insight is the large variation between multiple types of users. Having these broken down in detail has significantly impacted our plan of attack on how to build the GHO to maximise the number of UK home retrofits.

2.4 Market analysis

GHO provides the only consumer facing platform capable of making a custom business case for retrofit for every individual property in the UK. This will enable lenders to develop and target the most compelling retrofit finance products and allow customers to finance and execute upgrades in a cost-effective way, using trusted retrofit providers. It will also link

with green finance options, approved retrofit providers and retrofit value proposition for customers.

The closest comparable competitor is the Home Energy Saving Calculator developed by the Energy Saving Trust or the government's EPC register where each EPC will usually suggest possible retrofit upgrades.

Both differ from our proposed product as follows:

- cannot provide bespoke retrofit recommendations.
- does not link with green financing.
- does not develop a compelling business case for retrofit.
- does not link to retrofit providers.

The most innovative and potentially impactful aspect of the project is the capability of the platform to provide a bespoke retrofit financing package and compelling business case for each individual home in the UK, overcoming the misconception that retrofit is not affordable and does not deliver customer value. This requires integration of complex data sources from various sources to consider all the dimensions of a potential compelling business case.

An additional point of innovation will be the ability to track verification and connect with retrofit providers. This will allow an end-to-end view of the retrofit customer journey with data collection at every touch point which can be used to enhance the product and accelerate action in the future as well as inform policy and new products nationally.

A key building block in the GHO platform is the existing insights and data engine that Kamma developed. This engine already offers several points of innovation including:

- bespoke analysis for 36 million UK properties, providing the highest address matching accuracy available. The Kamma algorithm cycles through up to 200,000 permutations of retrofit for an individual property to recommend the optimum package to meet the customer's energy efficiency goal in seconds.
- correctly assesses the potential impact of heat pumps in a property. The government's EPC upgrade tool does not recognise heat pumps in improving energy efficiency currently.
- the model developed uses state of the art cost data (current prices for building materials and labour) unlike other tools mentioned where data is 10 years old and does not present accurate costs which in turn erodes customer confidence.

This project dramatically expands beyond Kamma's existing product by considering retrofit and financing opportunities for all possible UK properties, rather than just analysis of a lender's existing portfolio.

2.4.1 Consumer retrofit barriers

The primary retrofit barriers facing consumers that the GHO aimed to address are detailed below.

Retrofit Finance Challenges

Increasing energy costs and interest rates make a compelling business case for energy efficiency and low carbon heating improvements, however this is not obvious or clearly understood by domestic property owners (customers). There is a misconception that retrofitting a property requires large up front lump sum expenditure which is often deemed to be simply unaffordable.

Research[1] highlights that 75% of homeowners would like to make energy efficiency improvements to their homes in the next 5 years however the majority of these felt they could not afford to.

The Green Building Council's 2021 Retrofit Funding Proposition report[2] outlined that privately owned properties represent the largest and most challenging sector to retrofit. This is because of barriers including consumer awareness, access to attractive finance and limited trust in the supply chain. It also noted that emerging one stop shop models had the potential to accelerate progress and address barriers such as consumer awareness, access to attractive finance and limited trust in the supply chain.

Green finance products can actually spread the cost of retrofit overtime and result in preferential green mortgage premiums, which is not well understood.

Retrofit Data Challenge

The data currently available to support retrofit analysis is outdated, incorrect and incomplete, which presents expensive and unattractive retrofit options for customers.

The government's Energy Performance Certificate (EPC) register contains EPC records for properties with recommendations for upgrades which usually form the first step in a retrofit investigation, presenting several challenges:

- EPCs on the open register only exist for 53% of UK properties in Ordnance Survey's address data as calculated by Kamma.
- only 80-85% can be reconciled with properties due to difficulties with address matching.
- retrofit costs and recommendations are calculated using outdated data and methodologies.

[1]https://home.barclays/news/press-releases/2022/11/barclays-pilots-greener-home-reward-to-support-energy-efficiency/

[2] https://www.ukgbc.org/wp-content/uploads/2021/02/UKGBC-GFI-Roundtable.pdf

- fuel calculation costs are also out of date and do not take the property size into account.

Kamma developed a retrofit data and insights engine, in the GHO, which uses advanced address matching, machine learning and current construction industry and national grid data to create individual retrofit plans for 36 million UK properties. Using this engine, Kamma's proprietary analysis has shown that accurate data can reduce the cost to get a property to EPC C by, on average, 66% and deliver a 63% increase in fuel savings for the same investment, when compared with EPC register data.

Retrofit Provider Challenges

Customers also face challenges in confidently finding and engaging with retrofit providers, and due to a lack of customer awareness, retrofit providers spend significant amounts of time educating customers. This increases their average cost of sale which is ultimately passed on to the consumer pushing prices up. This educational journey can be driven by scaled technology solutions rather than expensive on-site consultancy.

2.5 Barriers to retrofit adoption

The GHO will directly tackle key barriers to retrofit adoption as detailed below:

Customer education/awareness - providing an easy to engage with tool, guiding customers through home retrofit options appropriate for their individual home, outlining relevant information to support decision making.

Affordability - working with lenders to identify optimum green finance products to incentivise retrofit, we will then provide clear financing and cost saving information specific to the property. The presentation of financing options on the platform will be optimised for ensuring customers understand that retrofit can ultimately enhance their financial position.

Confidence in providers - the platform will be a one stop shop for custom retrofit analysis, evaluation of financial products thereafter directing customers to approved retrofitters in their area. Customers will be able to review providers and feedback on work to instil confidence for other customers.

Benefits for retrofit providers - the platform will enable assessment and costing of retrofit work to a high level of accuracy, thus minimising the time spent by retrofitters in educating customers, it will also enable retrofit providers to engage with highly qualified leads (i.e., they have a retrofit plan and financing in place). This will maximise utility for providers.

2.5.1 Market size

One of the key learnings of the project was to break the UK residential market into 9 types with estimated populations against each:

Busy homeowner	5.09m

Professional landlord	4.73m
Uninterested homeowner	3.23m
DIY self-starter	2.47m
Confused homeowner	2.37m
Struggling tenant	1.10m
Eco-conscious homeowner	1.05m
Amateur landlord	0.77m
First time buyer	0.36m

These were calculated by taking figures for overall homes in England, Wales, Scotland and Ireland, and breakdowns for the constituent PRS, Social Housing and owner-occupier sectors[3]. We then multiplied these figures by the percentage of respondents in our surveys

[3] Overall UK homes = 29.66M
England: 24.87M as at 2021
Statista
Scotland: 2.67M as at 2021
nrscotland.gov.uk
Wales: 1.3M as at 2021
ons.gov.uk
Northern Ireland: 0.82M as at 2022
finance-ni.gov.uk

The private rented sector consists of 5.5M homes, which equates to 18.8% of the total housing stock
propertyreporter.co.uk

The social housing sector consists of 5.4M homes
England: 4.4M as at 2022
gov.uk
Scotland: 0.61M as at 2021
gov.scot
Wales: 0.24M as at 2021
gov.wales
Northern Ireland: 0.14M as at 2022
socialhousing.co.uk
Owner occupiers account for 19M (rounded to nearest million) homes (29.3M less PRS and social housing)

that provided certain feedback. For example: Busy Homeowner: From the homeowner survey, 26.8% of respondents said the reason for not retrofitting was “I have other priorities. When this percentage is applied to the total number of owner occupiers (19M) the resulting homes is 5.09M.

Breaking the UK residential market into 9 personas enabled a targeted and personalised strategy, allowing the project to tailor its solutions to the distinct needs and preferences of each segment. This increased the relevance and appeal of the GHO’s offerings.

Moreover, it facilitated efficient resource allocation. Different market segments require varying levels of resources and efforts. By understanding the estimated populations in each segment, the project can allocate its resources more effectively, focusing on segments with higher potential for impact.

Customisation is another benefit. Different segments may have unique levels of awareness, concerns, and priorities regarding green home improvements. Knowing the estimated populations within each segment allows the project to design customised solutions and messages that resonate with the target audience.

This approach also enhances scalability. It provides a structured method to expand the project, ensuring a broader adoption of green home improvements across diverse segments.

Additionally, it enables the project to set specific, measurable goals for each segment, making it easier to track and evaluate the project's impact within each category. Overall, breaking down the UK residential market into segments with estimated populations enhances the project's ability to effectively engage diverse consumer groups, cater to their specific needs, and allocate resources efficiently.

2.5.2 Enabling green investment and routes to market

The key consumer lessons learned in finding ways to enable green investment and routes to market include:

Awareness and Education: Consumers often lack awareness and understanding of green investment options and the benefits they offer. Effective education and awareness campaigns are crucial to inform consumers about green investment opportunities and their positive environmental and financial impacts.

Financial Accessibility: Consumers may face financial barriers to green investment, including the perception of high upfront costs. Providing accessible and attractive financing options, such as green loans or incentives, can encourage consumer participation in green investments.

Clear Value Proposition: Consumers need a clear and compelling value proposition for green investments. They want to understand the potential returns, cost savings, and

environmental benefits of such investments. Communication should focus on these advantages.

Trusted Information Sources: Consumers rely on trusted sources for information on green investments. Providing accurate, transparent, and credible information through reputable channels is essential to build consumer confidence.

Convenience and Ease: Consumers prefer straightforward and convenient processes for green investments. Streamlining administrative tasks and offering user-friendly platforms can reduce barriers to entry.

Incentives and Rewards: Incentives, rewards, or tax benefits can motivate consumers to engage in green investments. These can include rebates, grants, or preferential financing rates that make green investments more attractive.

Demonstrated Success Stories: Real-world examples of successful green investments can inspire and reassure consumers. Sharing case studies and showcasing the positive outcomes of green investments can be influential.

Customised Solutions: Consumers have unique needs and preferences. Offering customised solutions tailored to individual circumstances can increase consumer engagement.

Long-Term Commitment: Green investments often require a long-term perspective. Consumers need to understand the long-term benefits and be willing to commit to sustainability goals.

Transparency and Accountability: Transparency in reporting and accountability for the environmental impact of green investments are vital for consumer trust. Consumers want to see tangible results from their investments.

2.5.3 Cost of living and energy price crisis barriers

Economic conditions in the UK and globally have shifted significantly during the project term as energy prices soared following the war in Ukraine, precipitating a cost-of-living crisis that we are still within. This raised some additional challenges and opportunities for the GHO project to grapple with.

The rising cost of living, particularly increasing energy prices, has heightened concerns among consumers about the affordability of energy efficient retrofit projects. Many homeowners may perceive such projects as costly and unaffordable in the face of escalating energy bills.

The energy price crisis can make consumers hesitant to invest in energy efficient upgrades, as they may prioritise short-term financial stability over long-term savings. This reluctance can pose a barrier to the uptake of retrofit initiatives.

For some consumers, the financial strain resulting from the energy price crisis may limit their ability to allocate funds for retrofit projects. High energy bills may consume a significant portion of their income, leaving limited resources for investments in energy efficiency.

There may be a heightened demand for financial assistance and incentives to alleviate the financial burden of energy efficient retrofits. Consumers may seek government grants, subsidies, or financing options to make these projects more feasible.

Communicating the value proposition of energy efficient retrofits in the context of rising energy prices is essential. Consumers need to understand that such projects can lead to substantial long-term cost savings, which can offset the impact of increasing energy prices.

Ensuring that consumers have access to green financing options that offer favourable terms and rates is crucial. This can help them address the affordability challenges and initiate retrofit projects without significant financial strain.

Educating consumers about the long-term benefits of energy efficient retrofits, including reduced energy bills, improved comfort, and enhanced property value, is essential to encourage participation in the face of short-term cost pressures.

In light of the cost of living and energy price crisis, the project must address these challenges by providing clear, customised business cases for retrofitting that highlight long-term financial benefits whilst connecting consumers to accessible green financing options. This approach can help mitigate the financial barriers and encourage energy efficient retrofit projects regardless of the current state of energy markets and prices.

To ensure that cost estimations and projections remain accurate, the platform leverages dynamic data integration. This involves continuously updating data sources related to energy prices and real-time market trends for retrofit materials and labour costs. By doing so, the platform can provide users with the most current and relevant information, allowing them to adapt to changing market conditions.

In addition to these analytical tools, the platform provides guidance on risk mitigation strategies. For example, it may suggest energy efficient measures with shorter payback periods to reduce exposure to potential future price fluctuations. This helps homeowners make choices that align with their risk tolerance and long-term objectives.

2.6 Relationships and partnership building

2.6.1 Project partners

In the Discovery Phase, the GHO project team, with Kamma as the lead organisation and partners including Aldermore, One Savings Bank, Just Mortgages, Lendinvest, and British Gas, has made significant strides in expanding its knowledge base in the domains of energy efficiency, low-carbon heating, and micro-generation. Simultaneously, the team has forged

crucial relationships across the supply chain and property value chain with national, regional and SME retrofitters.

The GHO team has established strategic partnerships with lenders and finance advisors, beyond the initial project partners. These collaborations have allowed the project to leverage the financial expertise and networks of these institutions. By tapping into the knowledge of green finance products and understanding customer financing needs, the project can offer more informed and customised solutions.

Connecting with retrofit advice and information providers has been instrumental in enhancing the project's capabilities. These partnerships enable the project to deliver accurate and reliable information to homeowners, ensuring they are well-informed about energy efficient upgrades and the benefits they offer.

The team has actively sought relationships with energy efficiency assessors. These professionals play a critical role in evaluating properties and identifying opportunities for energy improvements. Their expertise contributes to the development of tailored retrofit recommendations and solutions for homeowners.

Partnerships with installers in the energy efficiency and low-carbon heating sectors have been cultivated to ensure that homeowners have access to high-quality services and products. These relationships enhance the supply chain by connecting homeowners with trusted providers for their retrofit projects.

The GHO project team has explored collaborations with quality assurance schemes, such as certification bodies or industry associations that uphold industry standards. These relationships are vital to ensure that retrofit work adheres to established quality and performance criteria, instilling confidence in consumers.

Through these engagements and partnerships, the project team has built a comprehensive knowledge base encompassing energy efficiency, low-carbon heating, and micro-generation. Additionally, it has established a robust network within the supply chain and property value chain, connecting with various stakeholders critical to the project's success. These relationships are instrumental in providing valuable information, resources, and solutions to homeowners, ultimately making energy efficient retrofit projects more accessible and successful.

2.6.2 Knowledge sharing

Knowledge sharing among partner organisations in the GHO project has been effectively managed through various approaches. Regular meetings and workshops have been scheduled to provide a structured platform for partners to share knowledge, updates, and insights, fostering open communication. Collaborative online platforms and project management tools have been employed to facilitate real-time access to shared documents, data, and project-related information, promoting efficient knowledge exchange.

Within the project team, specific roles or individuals have been designated as knowledge sharing champions, responsible for collecting, organising, and disseminating relevant information to partner organisations. They act as intermediaries for streamlined knowledge transfer. In addition, regular reporting requirements have been established, enabling partners to submit progress reports that communicate findings, achievements, and challenges. These reports are shared with the entire project team, promoting transparency and information exchange.

Dedicated communication channels, such as email lists, forums, or chat platforms, have been established to support ongoing discussions and knowledge sharing among partners. These channels enable real-time communication and collaborative problem-solving. Overall, effective knowledge sharing is a fundamental aspect of the Green Home Finance Accelerator - Discovery Phase project, ensuring that all partner organisations are well-informed, aligned, and able to contribute their expertise efficiently to achieve the project's objectives.

2.7 Lender and retrofit industry research

2.7.1 Background and objectives

Following on from our research of homeowner and landlord needs around retrofit, we conducted extensive analysis on the needs of lenders, and how best they can introduce products that support the shift to a greener built environment through retrofit funding. The objective was to understand what challenges and blockers exist when it comes to lending against retrofit work, and how an online marketplace could result in a greater proliferation of lending activity. The ultimate objective across both research phases is to understand how to drive a revolution in retrofitting in UK housing stock, by understanding customer, lender and supplier needs and unlocking their motivation to act.

2.7.2 Stakeholders

A successful retrofit marketplace needs to act as a harmonious ecosystem supporting various stakeholders. The stakeholders in a retrofit marketplace include, but are not limited to the following:

- The end customer: Homeowner and landlord
- Customer facilitators: Mortgage and loan intermediaries (brokers and advisors working on behalf of the end customer)
- Funding: Mortgage lenders, secured and unsecured loan providers, government grant schemes
- Fulfilment: Retrofit assessors, EPC assessors, retrofit installers, renewable energy providers
- Assurance/Insurance: Quality assurance of the work carried out by tradespeople, and parametric insurance as an option to cover any retrofit package shortfalls.

2.7.3 Understanding Needs Within a Marketplace Ecosystem

A series of interviews and workshops with stakeholders allowed us to get a better understanding of stakeholder needs. A summary of some key needs is given here, with implications for the development of a marketplace.

1. One thing in common across business types from lenders to installers was the need to acquire new customers, and that the lack of accurate data currently acts as a barrier, preventing lenders from identifying customer needs and tailoring customer journeys, products, and support. In order for lenders to provide the right funding and for installers to bid for the right installation projects, a digital view of the customer's precise retrofit needs would be advantageous.

2. Another highlight was the need for quality assured retrofit work. The public at large are not familiar with retrofit tradespeople and need a stamp of trustworthiness such as that offered by Trustmark accredited installers before they can make a decision with confidence. For lenders, there was a concern that they would be associated with the quality of work delivered, despite their lack of control over the end outcome.

3. Lenders have a perception that the demand for retrofit funding is quite low and are reluctant to resource heavily behind a smaller opportunity. Our research suggests demand is actually high, but a major barrier exists in the form of customer awareness and understanding. This may be down to a lack of education about what is possible at a reasonable price, and what returns can be expected on an investment in terms of energy bill savings, preferential interest rates and increased property value. A well-designed marketplace can offer that level of clarity and foster demand enabling lenders to launch healthy and profitable green lending products that support the overall Environmental, Social and Governance (ESG) goals of their businesses at large including helping their customers improve their longer-term affordability and wealth prospects.

4. Lenders are also cognisant of forthcoming legislation that will mandate an EPC rating of C or above for domestic properties, starting with private landlords. The government have recently announced[4] that the 2028 target for all rental properties to reach EPC C will be removed, but there is uncertainty as to what legislation may replace it. They have little visibility of the spend that would be required to make these properties future-compliant, and professional landlords with multiple properties need digital tools that can estimate the cheapest cost across hundreds of properties at a time. The dearth of such tools presents a significant credit risk for lenders. Ambiguity over the timing of the legislation adds to this confusion, making it harder for those responsible for ESG and

[4] https://www.gov.uk/government/news/pm-recommits-uk-to-net-zero-by-2050-and-pledges-a-fairer-path-to-achieving-target-to-ease-the-financial-burden-on-british-families

product development within mortgage lenders to gain support for more proactive green lending.

5. For the most effective green lending products (those that support customers to improve homes, rather than just rewarding those that live in already efficient properties), lenders need to validate that work has taken place, as a condition of the loan. This is hard to do in an efficient and low friction way, as it relies on additional consumer action. Lenders were concerned that green lending could be spent on any home improvement project, or even a new car, unless they had a way to validate that energy efficient improvements had taken place. In some cases, lenders' access to ESG investment could be threatened if they cannot demonstrate the impact of green lending.

2.8 Retrofit advice to consumers

During our Discovery Phase project we uncovered that customer understanding of retrofit varies significantly across users. For example, 30% of landlords answered the question, "Which of the following have or would motivate you to make energy efficiency improvements?" with the response "Getting a clear plan or guidance on what to do" showing that a significant proportion have a poor understanding of how to improve their properties. The GHO focuses on guiding users through the retrofit journey and enabling users to optionally "deep dive" into elements they wish to learn more about.

GHO clearly presents how the attributes of a property relate to the appropriateness of retrofit measures and their associated costs. It will then translate these measures to utility bill savings and property valuation increases. Clarity around this information empowers users to easily make the right product choices, as demonstrated by our Discovery Phase research.

Rather than prescribing how to improve a property, we show the optimal package, and allow the user to change elements, with clear educational pointers steering the user away from poor decisions. This appeals to users that want an element of control.

We follow the trusted "fabric first" approach, so insulation should be addressed before heating systems otherwise the efficiency of the system is somewhat lost through the outer fabric of the building. We utilise trusted industry sources to inform the advice we give, periodically reviewing the approach with industry partners.

We considered alternative approaches including an advice line that users could phone up and obtain further information from. This option was dismissed for a number of reasons, primarily due to the fact that it would quickly become a limiting factor in scaling the platform and user base. Our intention is to capture the majority of the residential property owner market which is technologically achievable given the infrastructure and design on the GHO. Building up "call centre" type functionality is not scalable in the same way as while optimisations can be achieved, increased numbers of paid people are required at the end of

a phone line. Furthermore, the GHO is built to be an end-to-end platform servicing the full user retrofit journey. Pushing users off the platform into other communication channels is at odds with this fundamental philosophy.

Similarly, signposting to third parties' existing services was considered but dismissed for two primary reasons. Firstly, as the GHO is an end-to-end tool, pushing people off the platform to other sites is counterproductive as they deal with different formats and tones of voice that are not tailored to the actions they are taking on the GHO. Secondly, without control of the content, we risk pushing people to suboptimal or simply wrong advice. The market standard SAP (Standard Assessment Procedure) methodology used to rate energy efficiency of properties for EPC purposes for example, massively underestimates the effect of heat pumps and much third-party advice reflects this. By keeping control of the content, tone of voice, and point of user impact, we can ensure that the provision of advice occurs at the right time in the most effective way.

2.9 Retrofit verification

The GHO will provide a two-pronged approach to verification. End users will be able to leave reviews and ratings of retrofit work after it has been carried out. In addition, we will obtain in-depth physical verification as part of an assessment service. For all upgrade work, we will request retrofit suppliers and end users to submit the final costs from their invoicing, along with each measure that was installed. They will be given a login to the marketplace with a list of all their inbound enquiries so they can simply update each record and upload documents easily if required providing reviews following their retrofit journey. These will include ratings on both price and quality of installation, allowing us to build robust indicators over time.

Our research highlighted that trusting installers and ensuring their work is a high reliable standard is a material issue for users as 10% of 1,074 owner occupiers surveyed said this was the primary issue stopping them from making improvements to their home. Mixing quantitative and qualitative feedback to produce reliability over time was found to be a popular solution to the problem with those that we surveyed.

2.10 Consumer marketing preferences

Consumers highly favour personalised retrofit suggestions, considering their property's characteristics, energy goals, and budget constraints. Marketing messages that highlight potential savings on utility bills, increased property value, and access to green financing options receive positive responses from consumers. Transparency and unbiased information about retrofit costs, benefits, and risks are crucial for consumer engagement. Trust in the platform and its partners is highly valued.

Real-life experiences and outcomes shared by other homeowners who have successfully completed retrofits play a significant role in consumer decision-making. A user-friendly and

intuitive platform interface simplifying property analysis, retrofit recommendations, and access to green financing options is preferred by consumers. Many consumers prefer mobile responsiveness, allowing them to access GHO tools and information on their smartphones for added convenience.

Consumers appreciate educational content that explains the benefits of retrofitting, available options, and potential impacts on their property and finances. Real-time data and updates on energy prices, financing rates, and potential savings are of interest to homeowners. Tools for tracking retrofit progress and financial impact over time are highly valued. Some consumers desire access to experts, such as energy assessors or retrofit professionals, to guide and assist them in making informed retrofit decisions.

These findings guided the design and marketing strategies of the GHO platform, aligning it with consumer preferences and needs. The platform aims to engage and empower homeowners in making energy efficient retrofit decisions through personalised recommendations, transparent information, financial benefits, and a user-friendly interface.

2.11 The Future of the GHO

2.11.1 Discovery phase lessons for future development

Lessons learned during the Discovery Phase will be pivotal in shaping the ongoing development and refinement of both the GHO project and future green finance products.

The user preferences and behaviours identified during the Discovery Phase will guide the design of the GHO platform, with a strong emphasis on providing a more user-friendly and engaging experience. The preference for mobile access will drive future projects to prioritise responsive design and mobile app development. This will ensure that users can conveniently access the platform or service through their smartphones and tablets. The appreciation for educational content will motivate future projects to provide informative materials that simplify complex concepts and help users understand the benefits of green finance and energy efficient retrofits.

Consumer marketing preferences revealed during the Discovery Phase will be integrated into the formulation of customised marketing strategies. Future green finance products will leverage these insights to create compelling and resonant marketing messages tailored to their target audiences. The GHO project's success in offering personalised retrofit recommendations will serve as a model for future initiatives. This approach has proven to be effective in engaging users and motivating them to pursue energy efficient retrofits.

The importance of transparency and trust in consumer engagement will be a foundational principle in the development of future products. These lessons emphasise open communication, clear information, and trustworthiness in partnerships.

Future initiatives will incorporate real-time data and tracking features to provide users with up-to-date information on energy prices, financing rates, and potential savings. These tools will boost user confidence and engagement.

Recognising the desire for expert guidance, future projects will establish pathways for users to seek advice from professionals in the fields of energy efficiency, retrofitting, or green finance.

The experiences and knowledge gained from the GHO project will guide the scalability and expansion strategies of future green finance products. These lessons will inform efforts to tap into market opportunities and navigate potential challenges.

In addition to using these learnings for product development, the consortium will also share insights and best practices within the green finance ecosystem. This knowledge-sharing approach will help disseminate the learnings from the project, fostering innovation and collaboration in the sector.

2.11.2 Challenges for future development

Key challenges and barriers for the future development of this green home finance proposition include:

- Consumer Awareness: Convincing consumers of the benefits of retrofitting remains a challenge. Addressing this requires continued education and awareness-building efforts.
- Lender Engagement: Ensuring lender engagement and the development of attractive green finance products is essential. Collaborative efforts with lenders are needed to optimise such products.
- Cost and Price Fluctuations: Navigating potential future fluctuations in energy costs and retrofit measures presents a challenge. Strategies for addressing price variations must be in place.

2.11.3 Overcoming future challenges

To overcome these barriers, concerted efforts are needed, including:

- Robust Education Campaigns: Continued and targeted consumer education campaigns can address the awareness challenge and highlight the financial and environmental benefits of retrofits.
- Strategic Lender Partnerships: Collaborative partnerships with lenders, similar to those established in the GHO project, will be crucial for the ongoing development of green finance products.
- Market Analysis and Adaptation: Regular market analysis to anticipate price fluctuations and adjusting green finance products accordingly is essential.

In summary, the lessons learned during the Discovery Phase will inform and guide the development of green finance products, ensuring that they are user-centric, transparent, and effective. These insights will also be shared within the industry to promote collaboration and innovation. Addressing ongoing challenges requires education, partnerships, and adaptability to market dynamics.