

Energy efficiency and decarbonising our homes

Technical briefing

Summary of key issues
and solutions to inform
the Good Home Inquiry

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About the Good Home Inquiry

Around 10 million people in England currently live in a home that presents a serious threat to their health and safety – defined by the government as ‘non-decent’ homes.

The Good Home Inquiry, commissioned by the Centre for Ageing Better, will provide an evidence-based analysis of England’s housing policies to determine the causes of, and solutions to, the poor quality of so much of our housing. The Inquiry is led by an independent panel and chaired by David Orr CBE.

The need to act is urgent. We have an ageing population, with one in four of us expected to be aged over 65 by 2050, and yet the UK’s housing stock is the oldest in Europe, and the least suited to deal with the adaptations needed to accommodate the changing needs of an older population.

The quality of our home is critical to our physical and mental health and wellbeing. Poor quality housing costs the NHS £1.4bn a year and has proved to be a factor that determines the likelihood of contracting COVID-19. Indeed, areas of the country where there is high incidence of COVID-19 map very closely to areas with the poorest quality or most overcrowded housing. Similarly, ethnic minority communities that are most likely to experience overcrowded or low-quality housing are also most likely to experience poor health outcomes related to housing.

Climate change offers a once in a generation challenge to transform our homes, and it is also a huge opportunity for us to rethink what a home can be. The UK government has legally enshrined its commitment to reach net zero carbon emissions by 2050, and it cannot do that without addressing the problem of low-quality housing. Despite the daunting scale of the task ahead of us, the retrofit challenge also represents an enormous opportunity to create multiple benefits by acting to improve and adapt our homes at the same time.

The increasing use of digitally enabled technology within the home means that anyone left without a good internet connection or the skills to make use of it will be left at a disadvantage. This will be particularly true if some of the ‘virtual’ services that have been brought in due to the pandemic become commonplace in a post-COVID world. Digital connectivity will therefore be as much a part of what makes a good home as warmth, comfort and safety.

Financing solutions must be found in three key areas: maintenance and

repairs; adaptations for ageing populations; and energy efficiency works. To pay for all of these, we need to develop a variety of innovative financing models – a combination of loans, grant, and third-party funding – and encourage better collaboration between industry and homeowners to bring about the changes required and unleash investment.

The benefits of good homes are wide, ranging from good health, financial stability and independent yet socially connected living. That is why investing in the maintenance and upgrade of our housing stock is not a philanthropic act, but rather a vital investment in a key piece of the nation's infrastructure.

The Inquiry, launched in July 2020, will run until autumn 2021. Inquiry Chair, David Orr CBE, is joined by a panel of three leading experts – Lord Victor Adebawale CBE, Vidhya Alakeson, and Pat Ritchie CBE – bringing a diverse range of experience and expertise.

The Inquiry supports the Centre for Ageing Better's goal that by 2030 more people aged 50 and over will live in homes that support them to live healthy and fulfilling later lives.

About the Centre for Ageing Better

The UK's population is undergoing a massive age shift. In less than 20 years, one in four people will be over 65.

The fact that many of us are living longer is a great achievement. But unless radical action is taken by government, business and others in society, millions of us risk missing out on enjoying those extra years.

At the Centre for Ageing Better we want everyone to enjoy later life. We create change in policy and practice informed by evidence and work with partners across England to improve employment, housing, health and communities.

We are a charitable foundation, funded by The National Lottery Community Fund, and part of the government's What Works Network.

Introduction

This briefing looks at how market mechanisms can be used to invest in the maintenance and upgrade of existing homes - triggered by, or related to, energy efficiency. The role of government in this context is primarily to create supportive market conditions through regulation, smart taxation and incentivisation, as well as supporting low-income homeowners through targeted interventions.

The renewed government emphasis on a net zero carbon future presents an opportunity to make our homes warm and cheaper to heat. While net zero might seem a massive delivery challenge, it presents an unequivocal target to create long term market stability with investment in innovation and high-performing solutions. These will bring a myriad of benefits to individuals' health and finances, and to the nation in terms of economic activity, job creation, savings in health and care spending, and meeting climate targets.

The Good Home Inquiry is therefore seeking to understand policy and intervention priorities for pathways to net zero for our existing homes. The Inquiry will look at the role of industry and homeowners in achieving the ambitious target of a carbon-neutral Britain. As well as delivering net zero, if we get this right, there is the opportunity to improve our homes in other ways and to respond to the needs of an ageing population.

The leading question is: What contribution can zero carbon energy measures make to improving our current housing stock, and how can the opportunities and imperative of the green agenda be harnessed to deliver wider benefits for our homes and health?

We also want to capture existing ideas and initiatives that can be built upon to create opportunities for change at scale.

Executive summary

To achieve the UK's carbon emission targets and to improve the quality, safety and comfort of our ageing housing stock we need to retrofit around 26 million homes – that's 1.6 homes every minute between now and 2050. To rise to this challenge, we no longer need incremental improvements but a seismic shift.

Delivering this net zero future presents a huge opportunity for industry to invest in new skills and jobs.¹ Safe, warm and affordable homes have a direct positive impact on people through improved health, reduced cost and increased comfort. Better performing homes leave residents with more disposable income, as households are spending less to stay warm in winter and cool in summer. Thus, energy-led retrofits are key to resolve underlying structural and systemic issues in our housing stock, such as health and safety hazards (non-decency) and the adaptations needed so that our housing stock is suitable for an ageing population.

Every home can be brought to a good, comfortable standard. Making our homes fit for the future is as much a national as an individual challenge. It requires long-term commitment and leadership from government and industry alike to invest in solutions that are fit for purpose not just today but for the next 30+ years. For individual homeowners, adapting and retrofitting their homes needs to be affordable and become as easy as buying a new car.

At a national level we need longevity in policy with targeted intervention and smart taxation linked to home performance. And we need to legislate for performance achieved in use, not (theoretical) planned design intent. This will enable industry to offer quality solutions, including through industrial off-site manufacture, at affordable prices and with performance guarantees. The payback is job creation, reduced emissions, and cleaner air. Energy-efficient retrofits boost the economy, save lives and improve our health – key for a greener recovery from the COVID-19 pandemic.

At the individual level, homeowners need support, as most are not experts on home adaptations or retrofitting. Ultimately, it is down to most individuals' choices whether or not to make changes to their homes. However, at present, too many technical, financial, regulatory and process barriers still exist in the market that make it very hard for homeowners to invest at scale. In order to overcome these barriers, we need impartial and professional help. This should include: a holistic assessment of the home

1 The term net zero relates to the UK's legal target of net zero greenhouse gas emissions by 2050 as set out in the 2019 amendment to the Climate Change Act 2008 (2050 Target Amendment): <https://www.legislation.gov.uk/ukxi/2019/1056/contents/made>

(existing health and safety hazards, light, space requirements, accessibility, energy systems and insulation); costed, quality solution design (whole house approach with compatible measures that could be implemented over time or in one go); tailored financing (own investment, loan and grant finance – possibly tax breaks too); procurement of trusted tradespeople; and quality control of the installation.

To make this happen, a professional and impartial intermediary – for example, a ‘Good Home Agency’, could become a one-stop-shop for homeowners on their journey to better homes. The Good Home Agency could support millions of homeowners at the local level while delivering against the national net zero strategy, leading to significant job creation, upskilling of the workforce and reducing the UK’s carbon footprint.

The primary purpose of this paper is to inform the Good Home Inquiry team, summarising key issues and capturing solutions that are forming in the market.

The environmental impact of our housing stock: What is the problem?

“Low-carbon retrofits and buildings that are fit for the future” is the first investment priority in the 2020 progress report of the Climate Change Committee to the UK government.² “87% of the current housing stock has been built before 1990 and almost a quarter of the pre-1990 housing stock is now more than 100 years old. With low annual replacement rates of about 0.5% more than 80% of the current residential dwellings will still be in use by 2050.”³

The UK’s legal target to cut greenhouse gas (GHG) emissions by 80% by 2050⁴ can therefore only be achieved if we significantly improve the energy efficiency of our existing homes which account for about 30% of the total energy demand in the UK, and about 20% of carbon emissions.⁵

There are also direct savings (reduced energy cost) for every home owner as well as wider societal benefits from reduced emissions (better air quality) and warm homes (better health) that can be translated into significant cost savings – for example the cost of poor housing on the NHS is estimated to be at least £1.4 billion per year.⁶ The human cost is very significant too: in 2018 an estimated 17,000 people died due to cold homes⁷ and around 2,000 people are dying every year because their homes overheat and cannot be cooled cost-effectively.⁸

2 <https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/>

3 <http://koreascience.or.kr/article/JAKO201424753521455.pdf>

4 <https://www.legislation.gov.uk/ukpga/2008/27/contents> - 1990 is the baseline reference year for GHG

5 <https://www.theiet.org/media/5276/retrofit.pdf>

6 <https://data.gov.uk/dataset/7e5361a6-8ee8-4811-b086-4e870fdaff6/the-cost-of-poor-housing-to-the-nhs> - the £1.4bn is based on improving all homes with HHSRS Category 1 hazards; the £2.5bn includes remediation of HHSRS Category 2 hazards.

7 <https://www.e3g.org/news/17000-people-in-the-uk-died-last-winter-due-to-cold-housing/>

8 <https://www.theccc.org.uk/wp-content/uploads/2019/07/Outcomes-Heat-preventable-deaths-case-study.pdf>

The environmental impact of our housing stock: what is the problem?

The All-Party Parliamentary Group for Healthy Homes and Buildings has made a recommendation to “make renovation of current housing stock and infrastructure a government priority and develop plans for retrofitting that takes a holistic approach to maximising health and wellbeing.”⁹ That means retrofitting around 26 million homes – that is 1.6 homes every minute between now and 2050.

Although almost 5.5 million homes were added to the UK’s dwelling stock¹⁰ since 1990 overall GHG emissions from UK households have remained relatively stable (1990: 142 Mtonnes CO₂e; 2017: 144 Mtonnes CO₂e).¹¹ This can mainly be attributed to the decarbonisation of energy supply and more efficient technology (GHG emissions from household’s electricity, gas and other fuels have decreased by about 35% since 1990). However, energy demand in 2017 (41.7 Mtonnes oil equivalent) is almost identical to 1990 (42,2 Mtoe)¹².

This means, improvement in technology and decarbonisation of the grid have thus far only managed not to increase the negative impact of our building stock on emissions and energy consumption. But, for the housing stock to play its part in the overall reduction to net zero emissions by 2050 we need to significantly reduce energy demand at the level of individual homes.

9 <https://healthyhomesbuildings.org.uk/wp-content/uploads/2018/10/HHB-APPG-White-Paper-V1.pdf>

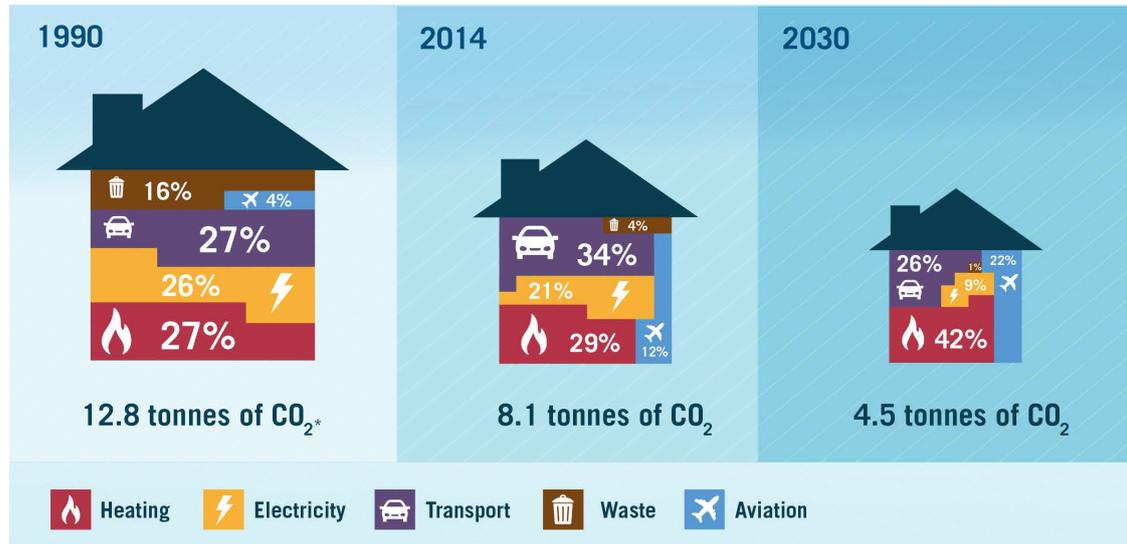
10 Calculations based on dwelling stock data published by England, Wales, Scotland and Northern Ireland.

11 <https://www.gov.uk/government/statistics/uks-carbon-footprint> and data table https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/878044/Data_download_consumption_emissions_1997_2017_v2.ods

12 For comparison, energy demand in industry has reduced by 42% in the same period.

The Committee for Climate Change forecasts that 42% of the average UK home's carbon footprint in 2030 will be due to heating¹³:

Figure 1: Forecast of average UK home carbon footprint



As over 75% of household energy demand is for space and water heating much more needs to be done to insulate our homes, thus significantly reducing demand, and at the same time switching to less carbon intense technologies, such as heat pumps and low carbon generation. These measures combined could reduce the carbon footprint of our homes by between 2.65 tCO₂e and 5 tCO₂e.¹⁴

¹³ Committee for Climate Change Infographics: <https://www.theccc.org.uk/wp-content/uploads/2016/07/5CB-Infographic-FINAL-.pdf>

¹⁴ Average figures based on CCC infographics; the lower CO₂e-saving is for homes that already have electric heating with larger savings achieved from homes that would switch from oil heating.

The challenge and opportunity of net zero homes

We are halfway through the 2050 journey to achieve our carbon targets and very little progress has been made to decarbonise the fabric of our homes. We no longer need incremental improvements but a seismic shift.

With almost 64% (15 million homes) of all residential properties being owner-occupied, headway into reducing our carbon emissions can only be made if we find a way to engage millions of individual owner-occupiers to join on the pathway to net zero homes. While some progress has been made in upgrading social housing stock, penetration into the owner-occupiers' market is very low. Policies and programmes to date have failed, either because of short-termism (start-stop funding), single-measure focus (e.g. boiler, cavity wall insulation) or ill-designed tools (e.g. Green Deal).

This situation is exacerbated by 4.3 million people that are living in non-decent homes, a number to rise due to ongoing lack of maintenance and investment – a mounting hidden debt for individuals and an increasing number of stranded assets across the country. And again, this is a particular concern for owner-occupiers which account for 62.4% of non-decent homes¹⁵.

While immediate action is required to address fuel poverty and repair the worst homes it is essential to keep the net zero pathway at the centre of our attention to avoid opportunity lockout. For example, installing the wrong measures now which will prevent future improvements, either due to cost and/or due to incompatible technology or design. In short, we need to keep people warm in a net zero way. Millions of homes need to be brought on track for net zero to enable warm, healthy, affordable living and for the UK to meet its carbon targets as well as achieve a strong, green recovery from the COVID-19 crisis.

Current energy efficiency investment decisions by owner-occupiers are very often made under stress - for example when a boiler breaks down in the middle of winter. Although a more energy efficient boiler might be installed, most often the opportunity is missed to consider a strategic switch to a better heat supply that would significantly improve the performance of the house on its way to net zero.

15 MHCLG: English Housing Survey – Home Ownership 2017-18 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817623/EHS_2017-18_Home_ownership_report.pdf

This decision is most often based on a combination of cost (a new conventional boiler is less expensive than a heat pump), ease (a like-for-like replacement is easily installed) and lack of knowledge or trust in 'new' technologies (heat pumps are used in every fridge and were developed around 150 years ago; yet they still suffer a bad reputation from more recent poor-quality installations).

With an average lifespan of 10-15 years the newly installed boiler is likely to prevent any further upgrade to the heating in that period. As owner-occupiers usually stay in their homes for 17.8 years on average¹⁶ it is highly unlikely that the same stress-buying homeowner will make another investment in their heating. However, these minor renovations (e.g. implementation of 1 or 2 measures such as a new boiler, resulting in 0% - 30% reduction in energy consumption) account for 85% of the total renovation market.¹⁷ Extensive renovations, where a holistic package of measures (leading to 60%-90% energy reduction) is installed, only reach an estimated market share of 5% of all renovations. Net-zero energy building renovations are negligible in the current market.

Barriers to net zero renovation can be broadly categorised as:

1. **Financial: renovation cost, access to finance, low energy prices**
2. **Technical: lack of solutions, lack of knowledge**
3. **Process: fragmentation of supply chain, disruption to resident**
4. **Regulatory: varying and ambivalent ambition of performance requirements, energy labelling (EPCs), competing priorities (e.g. quantity of homes over quality) and split incentive**

Homeowners across all tenures need solutions to overcome these barriers. Comprehensive home diagnostics (see below) with a costed pathway to net zero can address the first two points. When taken forward to implementation with an independent intermediary (see one-stop shop below) the process barriers can also be overcome. The regulatory barrier is best overcome by a commitment to net zero homes as a clear and unequivocal target.

The competing priorities barrier applies predominantly to professional private and social landlords. They may struggle for sufficient finance to get their entire stock to net zero or prioritise smaller but more numerous improvements to reach a larger proportion of their customers in a shorter

16 MHCLG: English Housing Survey – Home Ownership 2017-18 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817623/EHS_2017-18_Home_ownership_report.pdf

17 [https://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU\(2016\)587326_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU(2016)587326_EN.pdf)

The challenge and opportunity of net zero homes

period. Social landlords will also need to overcome the split incentive barrier – that is, residents benefitting from reduced energy cost that cannot be recovered by the landlord to refinance the investment. Alternative models, such as home comfort charges as trialled by Energiesprong, could overcome this issue.

If we get this right, there is a significant opportunity to bring all our homes to net zero in an affordable way for all tenures, while creating a huge market opportunity for industry to invest in new skills and jobs. For that to work, the large number of owner-occupiers need ready-to-go, full package solutions that industry can offer to homeowners when they reach trigger points for investment. These trigger points include the breakdown of a boiler which requires a fast response under stress, but also more planned investment decisions such as the purchase of a new property, the building of an extension, the fitting of a new kitchen or bathroom.

In either case, we need to move the conversation on from technical retrofit language with quick fixes and incremental improvements, to integrated product design that increases the attractiveness of our homes at the same time as lifting the property to net zero. This requires holistic solution design not proliferation of advice.

What are the options for solutions?

What are the routes to achieving change?

Every home can be brought to a good, comfortable¹⁸ standard, including the 4.3 million non-decent homes that fail to meet even the most basic requirements of a warm, healthy and safe place to live. However, homeowners and industry lack knowledge and data to understand what measures need to be taken on the journey to upgrade our existing buildings to good quality, net zero homes.

Home diagnostics for integrated whole-house solutions

The starting point of this journey must be a professional assessment of the status quo. Home diagnostics are key to identify current issues and map out a pathway to quality, net zero homes. The assessment needs to look at all aspects of a good home, including energy, health and safety, accessibility, air quality, space, light, security etc. Existing assessments are piecemeal and often not compatible to form a whole house picture.

Earlier attempts, such as the discontinued Home Information Pack (HIP)¹⁹, aimed to bring together a suite of documents that would provide better data and information for a residential property at the point of sale. HIPs included the Energy Performance Certificate (EPC), title documents, guarantees, Local Authority and drainage searches, a property information questionnaire, and a home condition report²⁰. While Scotland still has a legal requirement for Home Reports²¹, in England and Wales the Energy

18 Comfort is based on a variety of home performance factors, such as space, light, accessibility, connectivity, usability, warmth, air quality, ventilation etc. – good comfort can only be achieved through a well-balanced mix of these factors and there is also a degree of personalisation in the definition of a comfortable home. For the purpose of this paper, the emphasis is on thermal comfort and energy efficiency.

19 HIPs were introduced in the Housing Act 2004 as a legal requirement and repealed with the Localism Act 2011.

20 Some additional documents were required for leasehold properties, such as the service charge accounts (which can be a good indicator for the state of repairs).

21 <https://www.gov.scot/policies/homeowners/home-reports/>

What are the options for solutions? What are the routes to achieving change?

Performance Certificate (EPC) is the only remaining legally required document to be provided when a property is marketed for sale.

Providing good building data to the homeowner is an essential step to improve the quality of our homes. A comprehensive assessment should include not just technical issues but also user experience - asking occupiers what issues they have encountered living in the property is a good starting point to make our homes not only 'technically' compliant but also comfortable to live in. From that assessment an improvement plan can be developed and implemented over time. And if we want to grasp the significant opportunity associated with a carbon neutral Britain we need to look in more detail at the energy performance of our homes.

Performance contracting and quality-assured industry partners

When it comes to warmth and comfort in our homes, the metrics of the assessment need to be changed from design intent, or theoretical performance, to measuring actual performance. Experience with Energy Performance Certificates (EPCs) to date show they have limited impact in the market, particularly where housing demand outstrips supply.

However, recent analysis of homeowners during the COVID-19 lockdown suggests that environmental credentials of homes has become more important, with some evidence for value uplift in the highest EPC bands.²²

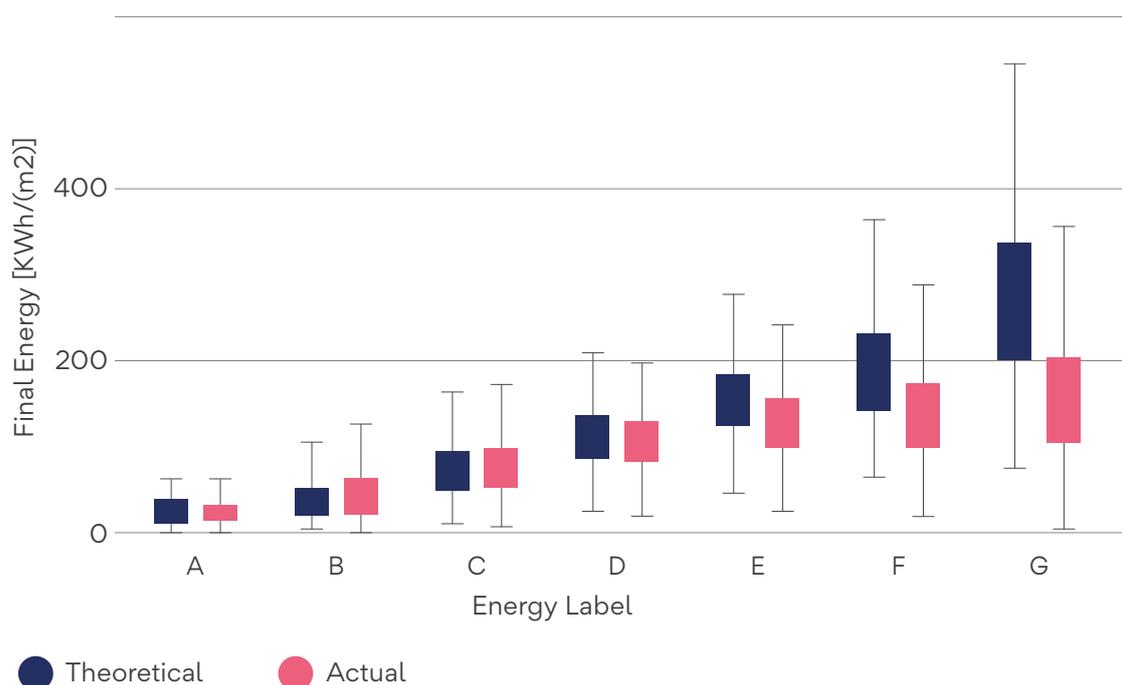
Nevertheless, the quality of EPCs needs to be improved significantly as currently there is little correlation between EPC ratings and actual energy performance.²³ A large proportion of existing EPCs are also incorrect, even

22 <https://www.savills.co.uk/blog/article/300856/residential-property/environmentally-thinking---boost-your-epc-to-boost-the-value-of-your-home.aspx>

23 There is a body of research that evidences the gap between EPC assessments and actual building performance. A large scale study was conducted by the University of Geneva (Figure 2 is from page 50: <https://archive-ouverte.unige.ch/unige:129181>) and evidence given to the UK Government in response to their consultation on Energy Performance Certificates for Buildings: <https://committees.parliament.uk/writtenevidence/6866/html> the full report can be accessed at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/922653/EPC_Summary_of_Responses.pdf The RICS points out "EPCs do not provide useful decision-making information: for a number of reasons – including a lack of trust in their accuracy, difficulty for occupiers/purchasers to translate the EPC ratings/grades into consumption and likely bills – first-generation EPCs have not been shown to be effective at providing a trustworthy measure that valuers perceive as influential on purchaser choices. Furthermore, as EPCs remain valid for ten years, alterations to the building and the obsolescence of some services may affect their accuracy at the date of valuation." (March 2019, p.21) <https://www.rics.org/uk/news-insight/research/insights/energy-efficiency-and-residential-values-a-changing-european-landscape/>

on fundamental data points such as size of the property.²⁴ The negative impact of inaccurate EPCs is made worse by the fact that most recent UK government home improvement programmes use EPCs as the underlying database for consumer advice, which ends up being misleading.²⁵ The most damaging effect is that homeowners lose trust in such schemes and it becomes even harder to achieve positive future engagement on home upgrades to net zero.

Figure 2: Theoretical and actual consumption per energy label



To achieve a step change in building performance it is essential that the quality of EPCs or other energy assessments is improved drastically. Both so that they can be trusted by consumers and so that they form a much more reliable basis for policy making and intervention design.²⁶

24 <https://spec.co/assets/pdf/Spec%20White%20Paper%20-%20Impacts%20of%20Inaccurate%20Area%20Measurement%20on%20EPC%20Grades.pdf>

25 <https://www.simpleenergyadvice.org.uk> – the portal to give consumers access to the Green Homes Grant.

26 At present policies and interventions are based on theoretical performance, such as an EPC assessment. Government should move to legislate for performance not theoretical design intent. A first step towards achieving this is a more robust approach to quality control EPC assessments and include in-use data.

What are the options for solutions? What are the routes to achieving change?

This could be done by an assessment that is calibrated with operational performance data to produce a validated, as-built EPC rating for the building. This would provide the homeowner with a trustworthy tool to determine a solid baseline and proof whether the predicted energy improvement has been achieved through the installed measures. The combination of baseline and in-use performance assessment could then form the basis for energy performance contracting between the homeowner and the installer. Industry could thus become a quality-controlled delivery partner for housing with a longer-term commitment to assured performance akin to other industry product warranties.²⁷

With such a significantly revised approach to assessing the performance of our homes the UK could then start building renovation strategies from individual homes upwards via neighbourhood and area-based levels to city-regions.²⁸ This could feed into and deliver long-term national renovation roadmaps.

Pathway to net zero to avoid “opportunity lockout”

Based on the home diagnostics a pathway to net zero can be established with costed solutions that can be implemented over time.²⁹ It is paramount that any measures installed do not prevent achieving the overall objective of net zero, thus delivering healthy homes and realising the full potential of economic, societal and environmental benefits.

The current government policy is to legislate for minimum energy efficiency standards (MEES)³⁰ in the private rental sector³¹ and in the social housing sector³². There is also the stated aspiration³³ to bring as many homes as possible to be EPC band C by 2035.³³

Enforcement is strongest in the social housing sector (as a highly regulated market), less strong in private rental (e.g. at point of new tenancies being let,

27 Individual home-owners are very likely to need professional help with this approach to quality-assured performance-contracting. Professional, large scale landlords could lead this new contracting approach while at the same time giving industry greater market potential through their housing stock.

28 Refer Leeds as UK example under <https://www.worldgbc.org/build-upon2-project>

29 Home Diagnostics include non-energy related assessments and measures to improve the quality and comfort of our homes beyond energy. However, for this paper the focus is on the energy performance.

30 <https://www.gov.uk/guidance/domestic-private-rented-property-minimum-energy-efficiency-standard-landlord-guidance>

31 Current minimum standard is EPC E with a government proposal for this to go up to EPC C by 2030 – ongoing consultation: <https://www.gov.uk/government/consultations/improving-the-energy-performance-of-privately-rented-homes>

32 EPC C by 2030, set out in BEIS Clean Growth Strategy.

33 Clean Growth Strategy: <https://www.gov.uk/government/publications/clean-growth-strategy/clean-growth-strategy-executive-summary>

however, weak position of tenants and lack of suitable alternative accommodation) and difficult in the owner-occupied sector (e.g. potentially only enforceable at point of sale, although current legislation only requires an EPC to be available at point of sale not a minimum EPC rating).

In any case the minimum EPC standards are a race to the bottom with huge potential for sunk investment if property owners only ever manage to achieve minimum compliance at the latest possible moment in time. Even for newly build homes the minimum standard is compliance with building regulations³⁴ which are a long way off the high-performing quality homes we need. We are still building homes today that will have to be retrofitted before 2050.³⁵

A much better and long-term strategy would be a commitment to net zero for every (existing and new) building now. Net zero is an unequivocal target, setting a clear trajectory which avoids sunk cost from interim targets (such as EPC C by 2035). Good quality home assessments would give homeowners and industry a timed and costed pathway to net zero where any measures installed lead to the final objective to make our building stock carbon neutral. Energy demand reduction is an obvious and very effective starting point on this journey but introducing on-site renewable energy production and storage play an equally important role. And there may be some buildings where net zero cannot be achieved locally, and only then should carbon offsetting be considered as an additional measure.

This strategy would require a combination of private investment and a range of funding mechanisms, including subsidised loans³⁶ and targeted grants.

34 Part L of Building Regulations establish a theoretical energy performance for the building.

35 Even with current low annual built rates of about 170,000 new homes an upgrade to net zero would still cost £1.7 billion every year projected into the future (an average cost of £10,919 to upgrade from EPC B as per UK building regulations for new build to an EPC A as net zero equivalent is used – the upgrade cost is from Savills Residential Research https://www.savills.co.uk/research_articles/229130/304623-0).

36 The German KfW is widely acknowledged as best practice to use interest subsidy to drive up energy performance in home renovations. Their loans for individual home owners also include finance for home adaptation in relation to barrier-free access and similar measures to enable independent living. <https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilie/>

What are the options for solutions? What are the routes to achieving change?

The building blocks on the pathway to net zero³⁷ are:

- Fabric first: reduce heat loss from existing stock through comprehensive insulation and air-tightness measures
- Reduce residents' consumption: replace household appliances and lights with the most energy efficient
- Switch to renewable energy sources: electrification of heat/hot water and energy systems with on-site generation (e.g. PV, solar thermal, air-/ground-source heat pumps etc.), allowing for easy grid-balancing (e.g. kWh-based grid-exchange not monetary measures, such as FiTs)
- Energy storage: combination of battery and thermal storage, also with potential for neighbourhood-based solution (e.g. private wire for shared battery use, local heat-networks)
- Off-set any remaining carbon emissions: primarily through grid decarbonisation (e.g. switch to renewable energy away from fossil fuels) but also carbon capture (both natural, e.g. trees, and artificial, e.g. carbon capture technologies)

The challenge will be to introduce this pathway to net zero into the owner-occupier's market. In theory, this would require 15 million³⁸ individual conversations to be had and concluded successfully. Therefore, we need to consider meaningful routes into this market that will get to scale and gain traction quickly.

Where to start for biggest impact: market entry and diffusion

Based on Everett Rogers theory³⁹ of how new ideas and technologies spread into the market, we could focus on the 2.5% innovators - e.g. households that are committed to reducing their carbon footprint, can afford to and are prepared to test new approaches. That would equal 375,000 homes in the owner-occupier market. However, it is more likely that these households will already have done something to improve their homes, while the non-decent home standard⁴⁰ is most likely to be found disproportionately in the late majority and laggards bracket of Everett's theory. For poorer households this is often a reflection of lack of means rather than choice.

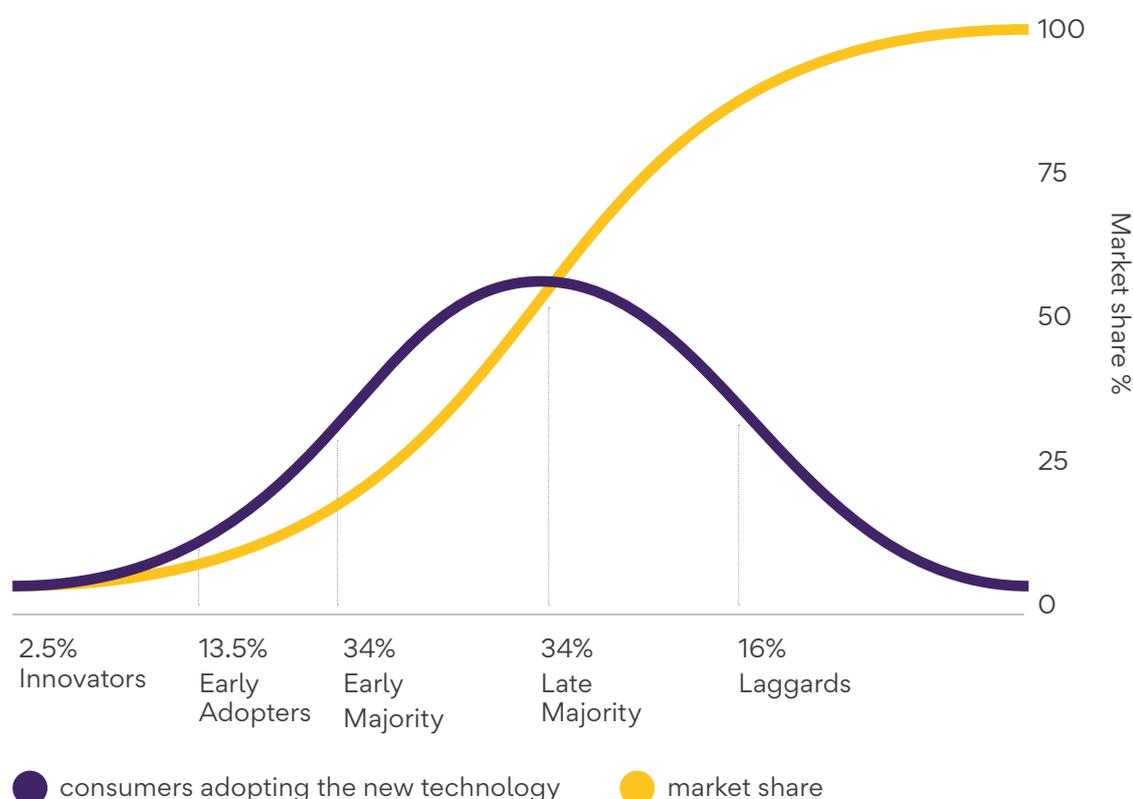
37 Looking at operational carbon not embodied carbon.

38 This being the number of owner-occupied residential properties.

39 Rogers, E. (1962) Diffusion of innovations. Free Press, London, NY, USA.

40 These homes have the greatest potential for energy savings and thus overall impact on GHG reduction.

Figure 3: Diffusion of innovations



A better and more formalised market entry point would be the sale of a property. With on average about 1 million residential property transactions in England⁴¹ there would be an opportunity to introduce pathway to net zero assessments alongside (or even replacing) the current legal requirement for an EPC to be provided at the point of sale. To avoid time delays with a mandatory obligation (e.g. due to lack of qualified assessors as seen with the EW1S form recently) the pathway to zero assessment could be voluntary (at least initially) and incentivised by a reduction in stamp duty (direct benefit to buyer) and capital gains tax (direct benefit to seller⁴²).

⁴¹ Data table: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/937251/MPT_Tab_Nov_20__cir_ods

⁴² If private residence relief applies maybe a tax credit could be given to the seller (to be offset against future tax bills, not just on capital gains but also income tax).

What are the options for solutions? What are the routes to achieving change?



This approach could be strengthened with a quality label for ‘net-zero-enabled’ to ‘net-zero-achieved’ and thus creating a new asset class of net zero property.⁴³ Voluntary commitments from the UK’s leading commercial property owners – collaborating through the Better Buildings Partnership (BBP) – have already

established a trajectory towards net zero carbon new and existing buildings.

In Australia, NABERS (National Australian Built Environment Rating System)⁴⁴ have established a simple to use sustainability rating system for commercial office buildings efficiency that assesses and star-rates energy, water, waste and indoor environment. Their motto “what gets measured gets managed” helps to keep building owners in control and as the NABERS rating is only valid for 12 months it is also an agile tool to monitor progress.⁴⁵ In addition to the star-rating they also provide a carbon neutral certification. Under the leadership of BBP, NABERS UK⁴⁶ has been launched on 26 November 2020, taking the learnings in Australia and tailoring them for the UK.

Extending and establishing such a quality scheme for residential properties could be the starting point for the seismic shift that we need to bring all our homes to a good standard.

The biggest gain, the biggest challenge: our worst performing homes

Another, and maybe complementary, market entry point would be to focus on the 4.3 million homes that are currently classified as non-decent. 62.4% (2.7 million) of these homes are owner-occupied. While the cost of repairs is a barrier to low-income households⁴⁷ there are other barriers as well: practical and health challenges that may affect the ability of homeowners to have repair works undertaken, lack of impartial advice and technical assistance. And for some homes the standards of the original construction are so poor that they may be beyond repair.

43 <https://www.arup.com/-/media/arup/files/publications/n/net-zero-carbon-buildings-three-steps-to-take-now.pdf>

44 <https://www.nabers.gov.au>

45 With 78% of Australia’s office space already rated with NABERS they have achieved significant coverage and penetration to establish a benchmark for others to adhere to.

46 <https://www.nabers.gov.au/about/nabers-international/uk>

47 21% of those in the lowest income quintile live in a non-decent home. “However, the fact that non-decency occurs across all income groups indicates the reality that for some, tackling disrepair is a challenge that goes beyond the ability to pay for the work.” Home and Dry report, page 26

Using home diagnostics as a starting point would ensure that not only HHSRS Category 1⁴⁸ are addressed but also other health and comfort issues as well as the overall efficiency of the property. If this assessment is provided by a trusted independent intermediary (see Good Home Agency below) owner-occupiers could also be assisted through the entire process to not only bring their homes out of non-decency but up to a good standard which is a much more positive and long-term solution. This service may become attractive to local authorities to discharge their duty (under the Housing Act 2004) to carry out enforcement action in relation to non-decent homes in a more positive and helpful way.

While there are no longer any repair grants available to lower income homeowners, the holistic approach of home diagnostics (integrating repair needs and adaptation with energy efficiency measures) may open up alternative funding, e.g. for households in fuel poverty or other vulnerable groups. Adding energy efficiency measures to the home improvement plan will provide households with greater financial stability and result in an increase of their disposable income due to energy cost savings. The Good Home Agency could then also assist the homeowner with a suitable financing solution, including where appropriate grants.

The good home bonus: smart taxation

To incentivise and enable owner-occupiers to set up their homes on a pathway to net zero, government could develop a smart taxation framework that links home performance to taxes due. Both the current stamp duty land tax and council tax are linked to property valuation, reflecting local markets but not overall quality of the home. Introducing an adjustment factor based on building performance would capture the intrinsic value of more (energy) efficient homes.⁴⁹

It is also proposed to extend the reduced rate of VAT (5%) for home energy products (such as solar panels, ground source/air source heat pumps)⁵⁰ to all home improvement works and to apply to installation cost as well. The “Cut the VAT” Campaign is led by the Federation of Master Builders; a national survey revealed that “VAT costs are deterring almost a quarter (23%) – roughly 4 million – of homeowners from improving their homes.”⁵¹ And independent research concludes that a “VAT cut on home improvements could generate £15bn in new taxes, create 95,000 jobs and unlock £1bn green revolution.”⁵²

48 Home diagnostics would include an assessment of any existing health and safety hazards; HHSRS Category 1 is used to define non-decent homes.

49 This is explored further under the finance theme of the Good Home Inquiry.

50 <https://www.gov.uk/tax-on-shopping/energy-saving-products> - the reduced VAT rate only applies to the product cost not the installation cost.

51 <https://www.fmb.org.uk/news-and-campaigns/campaigns/cut-the-vat.html>

52 <https://www.fmb.org.uk/resource/cut-the-vat-to-unleash-green-housing-revolution-party-leaders-urged.html>

A one-stop shop for homeowners: the Good Home Agency

While the building blocks for good homes are there, the biggest challenge is positive engagement with our 15 million homeowners. Owner-occupiers most often lack information and expertise required to bring their homes to a good quality standard. Home upgrades are complex and require specialist knowledge, starting with a comprehensive assessment (home diagnostics) for technology-/product-agnostic solution design (pathway to net zero) through to performance contracting for the installation of measures. Homeowners are confronted by a plethora of disparate choices, however, what they most need is a solution that works for their home. We need to make the experience of home improvements similar to buying a new car where the purchaser can choose the type and colour but doesn't have to worry about how the engine is put together. To provide this experience to homeowners, a trusted, independent market intermediary could be established: the Good Home Agency.

The Good Home Agency would be responsible for assessing the property and providing a costed, whole-house solution that could be implemented in one step or over time. They would provide finance packages (e.g. a combination of grant funding and loan finance) and procure reliable, qualified suppliers. They could also take on project management and supervision functions during the execution of the improvement works as well as final check upon completion.⁵³

Services offered by the Good Home Agency could be publicly funded for specific target groups (e.g. vulnerable households) While the majority should be positioned as a commercial offer. Also, certain elements of the service offer could be offset by the customer against tax, e.g. the home assessment to net zero could be tax-deductible (see section on smart taxation).

The Good Home Agency would establish a trusted national brand that can be used for local delivery. This would strengthen and scale up already existing projects and initiatives (see examples in next section). It is paramount that such a national initiative would build upon existing best

⁵³ A qualified Retrofit Coordinator would be essential to ensure works are completed to required standards.

practice and make best use of already well-established accreditation schemes (e.g. TrustMark, Retrofit Academy etc.).

The core characteristics of a trusted one-stop shop for homeowners, their set-up funding and capitalisation as well as statutory duties are explored further in a separate paper. In summary, a Good Home Agency needs to be:

- Tasked with a statutory duty to improve homes (core mission)
- Impartial (market maker bringing together homeowners, industry, finance and government)
- Solution-focused (e.g. technology-agnostic to bring the most suitable, long-term solutions and innovation to home upgrades)
- Financially independent
- Non-political with cross-party support to ensure longevity

Where are these solutions (at least partially) being met?

There are a number of existing projects, initiatives and companies that already provide advice and services that are essential building blocks to scale up the market for quality home improvements. These include:

1. Home diagnostics and costed pathway to net zero: Parity Projects

<https://parityprojects.com>

Parity Projects was founded in 2005. Their mission is ‘to provide the most cost-effective route to Net Zero for the UK’s homes.’ Parity Projects uses data science, software and analysis to help its clients deliver energy efficiency efficiently, and effectively. They work with local authorities and landlords of every size to develop cost-effective retrofit programmes that meet their cost, comfort and carbon goals.

Services include:

- Energy Efficiency Data Analytics: CROHM platform provides tailored investment options for each home under analysis.
- Net Zero Strategy: identify baselines and test future scenarios for Net Zero planning
- Retrofit Programmes: working with (social) landlords to bring in Parity’s experience of area-based retrofit programmes to design and deliver local retrofit schemes

Parity Projects have already undertaken large scale home assessments (data for 7+ million homes available) and recently launched Ecofurb (<https://ecofurb.com>) which provides qualified advice and solutions for home owners who wish to upgrade their properties in a low carbon way. This service starts with a home assessment (Ecofurb plan) and takes the owner through tailored advice and quotes to installation with a final sign off by an independent assessor.

Although the focus is on energy efficiency, Ecofurb is the closest to providing fully costed, whole house solutions for owner-occupiers in the able-to-pay sector, including procurement of installers and quality assurance of installations. They do not offer financial advice.

2. One-stop shop: Retrofit Works

<https://retrofitworks.co.uk>

Retrofit Works is a ‘not for private profit’ co-operative, matching communities and homeowners who want to retrofit their homes, with local, quality assured SME assessors and installers. They bring together Retrofit Works Advocates (organisations that bring together customers, e.g. as community groups, local authorities etc.) and Retrofit Works Practitioners (certified companies to carry out retrofit advice, assessment, design and installation). They undertake energy surveys and household assessments to generate quotes from quality vetted installers to offer one-stop-shop guaranteed retrofit installation.

They also offer advice and industry quotes on the Green Homes Grant based on a whole house assessment. For installers Retrofit Works also offers TrustMark accreditation (see below).

International examples:

Opengela, Spain (one-stop shop) <http://opengela.eus/en>

Energieheld, Germany (assessment / advice not quite a one-stop shop)
<https://www.energieheld.de>

Doremi, France <https://www.renovation-doremi.com>

3. National advice network: EST Scotland

<https://energysavingtrust.org.uk/programme/home-energy-scotland/>

The Energy Saving Trust in Scotland (on behalf of the Scottish Government) manages a variety of schemes to increase the take-up of home energy efficiency measures and reduce fuel poverty, while also helping to reach national carbon emission reduction targets. The schemes are delivered through Home Energy Scotland, a network of local advice centres covering all of Scotland.

4. Home Improvement Agencies: Foundations

<https://www.foundations.uk.com>

Foundations is the National Body for Home Improvement Agencies in England. They are contracted by the Ministry of Housing, Communities and Local Government (MHCLG) to oversee a national network of nearly 200 home improvement agencies (HIAs) and handy person providers across the country. Since 2015 they have also been supporting local authorities to improve how they deliver Disabled Facilities Grants (DFGs) – whether they use a HIA or not. Their services are focused on low income, older owner-occupiers and cover home repair, maintenance and adaptation.

Where are these solutions (at least partially) being met?

5. Whole-house, performance-assured solutions: Energiesprong

<https://www.energiesprong.uk>

Energiesprong provides net-zero energy makeovers with long-term performance guarantees at fixed cost. Their main objective is to drive down cost through automisation and off-site manufacturing with very short intervention times on site to reduce disruption.

Their initial market is social housing with first completed projects in Nottingham and Maldon (Essex). A pipeline of further net zero retrofits is contracted in Nottingham and Sutton.⁵⁴

The unique selling point of Energiesprong is the technology-agnostic procurement based on performance specifications that industry has to meet which encourages innovation. Contracting is on the basis of in-use performance which allows the social housing provider to give cost guarantees for comfort to their tenants.

6. In-use performance assessment: NABERS

<https://www.nabers.gov.au/about/nabers-international/uk>

NABERS is a simple, reliable system for rating the energy efficiency of office buildings across England, Wales, Scotland and Northern Ireland. Like the efficiency star ratings that you get on your fridge or washing machine, NABERS provides a rating from one to six stars for offices. This helps building owners to understand their building's performance versus other similar buildings, providing a benchmark for progress.

NABERS (National Australian Built Environment Rating System) has been successfully pioneered in Australia. Since 1998 NABERS helped their customers to save an average of 30-40% on their energy over 10 years. The NABERS rating is valid for 12 months to ensure any changes to the building are captured, thus providing a very agile process for real, in-use performance assessment.

Promoted by the Better Buildings Partnership, NABERS UK has been launched on 26 November 2020. The scheme is administered by BRE.⁵⁵

7. Accreditation schemes: Trustmark

<https://www.trustmark.org.uk>

TrustMark is the Government Endorsed Quality Scheme covering work a

54 <https://www.energiesprong.uk/newspage/energiesprong-uk-wins-twice-in-whole-house-retrofit-competition-beis>

55 <https://www.bregroup.com/nabers-uk/>

consumer chooses to have carried out in or around their home. Established in 2005 as a not-for-profit social enterprise TrustMark registers tradespeople against a long list of trades. Their website also includes whole house retrofit (<https://www.trustmark.org.uk/tradespeople/whole-house-retrofit---trade>) and they sign post to the Retrofit Academy (see below) for Level 5 Diplomas requirements for Retrofit Assessors and Retrofit Coordinators before they can become registered with TrustMark. They also include a related section on PAS 2035. In addition to registered businesses TrustMark also provides consumer advice related to the Green Homes Grant Voucher scheme and then sign-posting to Simply Energy Advice for eligibility check.

8. Skills and qualifications: Retrofit Academy

<https://www.retrofitacademy.org>

The Retrofit Academy CIC is a not-for-profit training company dedicated to improving the capabilities of the UK retrofit sector. Their mission is ‘to ensure that the UK has a sufficient number of retrofit professionals to enable the roll-out of deep retrofit at scale.’ They provide training for Retrofit Coordinators, a role which since June 2019 has been made mandatory for retrofit projects delivered under BSI PAS 2035.

The Retrofit Academy is the only BSI approved and recognised TrustMark provider of the Level 5 Diploma in Retrofit Coordination and Risk Management.

As a training provider the Retrofit Academy could play an essential role in assuring quality of solution design in the context of a next generation HIA (Good Home Agency).

9. Access to finance: Lendology

<https://www.lendology.org.uk>

Lendology CIC is a community lender working in partnership with 18 local councils across the South West. They are recycling council funds by lending to eligible homeowners, landlords, empty property owners, and park homeowners for essential home repairs or improvements.

Restrictions of their operations are eligibility of homeowners which is determined by each local authority according to their policies and loans can only be provided within the geographic scope of the 18 partnering local councils.

Finance for home improvements is analysed in more detail in a parallel paper, however, Lendology operate at the interface between home improvement advice and provision of finance (loans). Their services would complement initiatives such as Ecofurb to become even more akin to a Good Home Agency at local level.

Let's take action today for all our tomorrows.
Let's make ageing better.



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