

Evaluation of Government Actions Discouraging Housing Energy Retrofit in the UK: A Critical Review

Chamara Panakaduwa, Paul Coates, Mustapha Munir

Line 3 School of Science, Engineering and Environment, University of Salford,
43 Crescent, Salford, M4 5WT, United Kingdom
chamarapanakaduwa@gmail.com

Abstract—Housing energy retrofit has become a key priority in achieving the climate goals in the UK, mainly reaching net zero by 2050. However, the poor demand for housing retrofit from the homeowners has been identified as a key problem in driving retrofit at a scale. The existing progress in housing energy retrofit in the UK is critically poor. Some of the government actions have been noted to discourage homeowners from retrofitting their houses. This study has critically evaluated the government actions and policies which can discourage housing retrofit. The study has been conducted as a critical policy review by focusing on government actions and policies under eight topics. The findings indicate that inconsistencies in government acts have discouraged homeowners from engaging in housing energy retrofit to a considerable level in some cases. The study highlights the importance of a systems approach with a strategic focus.

Index Terms -- Climate policy, Energy, Government, Housing retrofit, United Kingdom.

I. INTRODUCTION

The UK has nearly 30 million housing stock [1] and almost all the houses need some level of improvement to achieve the net zero goals [2]. It has been noted that the housing stock in the UK is the oldest and worst-performing in terms of energy efficiency [3, 4]. Retrofitting the housing stock includes adding insulation, upgrading the heating system, draft proofing, removing thermal bridges, using smart home controls, installing renewable measures, improving air tightness and ventilation [5-7]. The benefits of housing retrofit are not limited to energy efficiency. Researchers argue that the main benefit of retrofit is better health [8, 9]. Further, energy bill savings, better comfort, increased asset value, higher durability of the asset, better quality of life, reducing carbon emissions can be given as examples of housing retrofit benefits [10].

Focusing on the national level, eliminating fuel poverty, keeping the residents healthy and reducing carbon emissions from housing operations can be identified as the three key benefits of retrofit [4, 6, 9]. The annual health cost due to poor housing has been estimated at GBP 18 billion. This reason

itself can be given as the business case for housing retrofit. Further, around 3.3 million households are reported to be in fuel poverty [11]. Fuel poverty is a critical challenge to the government [12]. The housing stock in the UK is reported to contribute 18% to the national carbon emissions [13]. Retrofitting the housing stock is a key priority to achieve net zero emissions.

According to the Climate Change Act 2008, the UK government is legally required to achieve net zero by 2050 [14]. For this purpose, the Climate Change Committee [CCC] has been appointed by the Climate Change Act 2008, to advise the government and to prepare five-year carbon budgets. The carbon budgets are prepared in a trajectory to achieve net zero emissions by 2050 [15]. The UK has achieved its first and second carbon budgets. The 3rd carbon budget from 2017 to 2018 is on track [16]. However, the CCC warns that the likelihood of achieving 4th, 5th and 6th carbon budgets is unlikely according to the current progress [17]. The UK expects to achieve a 78% reduction in carbon emissions by 2035, compared to 1990 levels [18]. As far as the housing sector is concerned, the housing sector emissions should be reduced to 4 MtCO₂e by 2050 from 85 MtCO₂e in 2017 [19]. However, while the overall emission reduction is 48% from 1990 to 2021, the housing sector was able to reduce the emissions by only 14% [20].

In terms of government policies and actions regarding housing retrofit, there were a number of government-funded retrofit drives to improve the building fabric before 2010. However, the past decade is called the lost decade of insulation, as the number of insulation measures installed was extremely low [21]. The “Green Deal” was a mass-scale retrofit drive, which was introduced in 2013. It targeted to retrofit of more than 14 million houses. However, the program failed with nearly 14,000 retrofits [22]. The Green Deal is considered an eye-opener about retrofit measures and retrofit promotion. In 2015, the report “Each Home Counts” was published with recommendations to drive retrofit in the UK [23]. It is considered the long-term failure of domestic retrofits. In line with the recommendations of the report, PAS 2035 was introduced to bring standardization to the retrofit industry to

focus on whole-house retrofit and to avoid unintended consequences of retrofit. Further, each home counts report recommended levelling up the skilled workforce [24]. In addition, the government has implemented numerous funding schemes to drive retrofit. This includes levelling up the skilled workforce, promoting supply chains, promoting research and innovation, and improving industry collaboration.

Although progress can be seen, this is insufficient to meet housing sector decarbonisation targets. Climate change committee recommends that there should be a strong commitment from the government to achieve net zero targets [25]. In the case of housing retrofit, some of the government actions themselves are not complementary. For example, while the government promotes moving away from fossil fuels to electricity, electricity is three times more expensive than natural gas [26]. Researchers argue that the poorly integrated approach, lack of leadership and lack of strategic planning have caused these inconsistencies [27-30]. It is argued that the existing lack of demand for housing retrofit [2] is stimulated due to these inconsistencies in government policy and action. By considering the above, this study focuses on the following research question.

Which government actions can negatively influence housing energy retrofit in the UK and how this can be addressed?

II. METHODOLOGY

This study has used a qualitative approach to data collection and analysis. It has used the critical review method according to Grant and Booth (2009) [31]. This critical review focuses on the UK government's policies and actions to analyse both the positive and negative influence of housing retrofit. In this study, the government actions and policies were summarized under several key themes. The literature was then critically reviewed to understand inconsistencies among these policies and actions.

It is important to note that the study has considered both policies and actions by the UK government. In some cases, not only the explicit public policies but also the statements by the UK government officials have caused significant changes in the industry. For example, the prime minister's speech in September 2023 about relaxation of minimum energy efficiency measures [MEES] has demotivated the landlords' commitment to retrofit private rented properties [32]. Once these inconsistencies are noted, the discussion section makes suggestions to overcome them through a theoretical approach.

III. RESULTS

A. *The price difference between electricity and natural gas.*

As far as the UK government strategies are analysed, they have mainly focused on the decarbonised electricity grid and electrification of energy. Further, innovations such as Hydrogen are expected to be used in hard-to-electrify sectors [33, 34]. The Government has committed to fully decarbonised electricity generation by 2035 [35]. However, the Climate Change Committee has advised the government to go for rapid electrification for the building sector, without

waiting for Hydrogen [36]. The government published the heat pump strategy where they expect to install heat pumps for 90% of the UK homes. Since 2028, they expect to install 600,000 heat pumps per year [37].

Despite these interests to go for an electrified decarbonised plan, the price of electricity is currently around three times higher than natural gas [26]. According to a report issued by the parliament, the reason is how the electricity prices are currently calculated. The electricity wholesale price is based on the natural gas price [38]. Further, electricity is subject to a carbon tax, whereas gas is not. Another reason is that the government loads policy costs on the electricity prices [39]. Currently, the SDHF (Social Housing and Decarbonisation Fund) recommended heating demand for heat pump installation is 90 kWh/m²a as long as it improves the EPC rating to "C". However, this level of heating demand can increase the electricity bill of a house after retrofitting the house with a heat pump due to the gas-electricity price disparity [40]. This means retrofitting the house under SDHF may push a resident into fuel poverty which does not make sense at all.

B. *Value Added Tax on retrofit products and services.*

When a new residential house is built, there is usually no VAT (Value added Tax) applicable as the government promotes building new houses [41]. However, when it comes to retrofit, most of the products and services have to pay VAT, either 20% or 5%. Considering this disparity between new build and retrofit in terms of VAT, the government introduced a five-year zero VAT concessionary window from 2022 to 2027 and 5% VAT thereafter for several retrofit measures. However, this does not cover the whole scope of housing retrofit [42]. According to this concession, there are some reduced rates of VAT and zero VAT available on some energy efficiency related products and services. However, these concessions are subject to conditions and not all the retrofit measures and projects are covered [43]. For example, if a mechanical ventilation and heat recovery [MVHR] system is installed in a residential property, the VAT rate is 20% [44]. The PAS 2035 standard highlights the importance of proper ventilation when houses are retrofitted [6]. The best practices and certifications such as Passivhaus also recommend MVHR as part of the ventilation strategy [7].

C. *Stamp duty concessions to buy an energy-efficient house.*

When a potential buyer is evaluating the options of buying a house, either they can buy a new built or existing property. Currently, stamp duty is charged based on the sales value of the property and there is no link to the energy efficiency of the house. RIBA (2020) has recommended to go for a variable rate of stamp duty, which is linked with the energy performance of the house [45]. Currently, there is a relief for net zero carbon homes to waive off the stamp duty since 2007 [46]. However, it is not a variable rate according to the energy efficiency. Further, HM Treasury can seek ways of promoting retrofit by linking the tax system to the energy efficiency of a house. E.g., Inheritance tax, council tax and capital gains tax.

On the other hand, the government can earn GBP 1.46 through tax revenue and budget savings for every GBP 1 invested for housing retrofit [21].

D. Frequent changes to the policies.

The latest government report about the net zero strategy “Mission Zero” emphasizes that they need to provide a certainty of the date of phasing out gas boilers [47]. That means there is no certainty that there will be a phasing out of gas boilers by 2035. Further, Prime Minister Rishi Sunak in his September 2023 speech said they do not expect to mandate the gas boiler phase-out by 2035 [48]. However, the whole industry was working out to face the gas boilers going out of use by 2035. This has caused a loss of confidence of the heat pump manufacturers and the climate change enthusiasts [49]. Ironically, the government’s heat and building strategy says they will communicate any regulatory changes early in advance for the industry to get ready. They have given the gas boiler phase-out as an example [50]. This was not the first time the government had changed their direction and commitments.

The code for sustainable homes was introduced in 2007 as a response to Stern’s review (Stern, 2006). It replaced the earlier EcoHomes assessment of BRE. The code was introduced as a voluntary standard but stated that it would be mandatory for all new homes from 2016. The code required all new homes from 2016 to be mandatory net zero carbon [51]. However, the government withdrew this code in 2015 stating that it would impede the progress of the new house construction rate, which was a key priority of the government [52].

E. Spending public money on short-term solutions.

There is criticism from the industry and sustainable enthusiasts that the government focuses more on short-term popular measures rather than strategic measures. This is signposted by Peters (2005) as the changing nature of social problems [53]. During the period of high energy bills from 2022 to 2023, the UK government was reported to spend GBP 66 billion for the energy price guarantee, just to keep the energy prices stable [54]. However, there is an argument that if these funds were used to upgrade the housing stocks, there would be a considerable reduction in the demand which could keep the prices low. For example, the existing available grant value is only around GBP 12 billion to retrofit the existing houses [55]. Further, the Labour Party has earlier agreed to spend GBP 28 billion annually on green energy in the UK to reach decarbonisation by 2030 in their political manifesto. However, now they say they can’t afford it [56]. Although the labour is not in power, the commitment of the main opposition party matters to what the ruling party will do.

F. Insufficient minimum energy efficiency levels.

The minimum energy efficiency standard [MEES] is the government-announced minimum energy efficiency level for private rented landlords. Currently, the MEES level is EPC [Energy Performance Certificate] level “D”. Accordingly, no

property can be let if it doesn’t minimum “D” rating. This was planned to increase up to “C” by 2025 for new tenancies and 2028 for existing tenancies [57]. However, the prime minister withdrew this minimum rating increase due to the economic hardships of the landlords [49]. The industry experts stated their disappointment with this government’s U-turn, as the private rental houses market has already prepared for this MEES regulation [32, 49].

As previously discussed, the code for sustainable homes requires all new houses to net zero emissions [51]. If that was implemented by 2016, the houses built after 2016 would not require any kind of future retrofit. The climate change committee has presented that most of the newly built houses are either EPC “A, B or C” bands [58], which is a good sign. However, there are other criticisms of the insufficient level of energy efficiency for the newly built houses, as even the part “L” recommendations are not aimed at a net zero emissions house [59]. As a response to this, the “Future Homes standard” is coming to life by 2025 [60]. However, the UKGBC warns that even the future home standards have a number of loopholes [59]. For example, the consultation expects to give exemptions for this standard, where the conditions are not clear. Although these regulations are for newly built, they can be applied to existing houses when they are subject to retrofit [61].

G. Overreliance on innovations to solve problems.

The Climate Change Committee clearly states that the current focus of housing decarbonisation should be based on electrification, without relying on Hydrogen or other innovations [36]. The government’s heat and building strategy predicts that future heating strategy will be a mix of Hydrogen, heat networks and electricity [50]. Although Hydrogen is not an innovation, it is not commercially available as a cheaper and sustainable source of heating. In addition to Hydrogen, there are some other alternatives such as advanced batteries or carbon capture & storage [62]. District heating networks based on geothermal heat is another suggestion to heat the houses [63]. Currently, there are nearly 30 million houses to be retrofitted before 2050, to achieve net zero [2]. This means more than 3,000 homes to be retrofitted per single day, which is a quite challenge. By endorsing this, Lord Deben says the biggest gap in the government policies is to reduce the energy demand of the existing houses [54]. LETI (2021) shows that the existing grid capacity is a critical barrier to decarbonisation without reducing the energy demand from the housing stock. The grid has its own limits and the burden on the grid will be further increased when the transport, manufacturing and commercial building heating are all electrified. In this case, net zero is impossible to achieve without reducing demand [4]. By considering this, it can be argued that the government is expecting some magic innovations to come and reduce the energy demand of the housing stock.

H. Decision-making based on technical rational models.

Another identified policy issue is the overreliance on the technical rational models. This is highly observed in the context of homeowners and housing retrofit. The researchers point out that the government decision-making is not taking the general stakeholder behaviour of housing retrofit into account. When making policy decisions, the government expects people to behave in a certain rationality [64-66]. This has been clearly noted in the Green Deal deployment in 2013. The Green Deal retrofit program was based on the notion that people will make retrofit decisions by looking at the financial payback of retrofit measures [22]. Another example can be noted with the existing home upgrade grant scheme. In this scheme, the government has targeted households which are off the gas grid or which never had central gas heating [67]. The government may have expected that since they did not ever have gas central heating, they may have been experiencing poor affordability for heating, poor health and poor quality of life. Accordingly, they are the top priority group of people.

However, the research suggests otherwise. Suhr and Hunt (2019) say that some older houses are more comfortable, more healthy and sometimes even cheaper to heat [68]. The houses built or insulated without proper ventilation are susceptible to mould growth and other unintended consequences, even they are new [69]. It seems that the urgency of the retrofit does not depend on the way they are heated. On the other hand, the people who don't have gas central heating may not have central gas heating as they can't afford it, but they don't like it. Technically, this segment can be the laggards according to the diffusion of innovations theory [70].

The researchers suggest the importance of neighbourhoods to promote housing retrofit. When a neighbour, a relative or a friend has retrofitted their houses and enjoying the benefit, that can be a rigorous trigger from someone to retrofit their house [71]. Focusing the householders without central gas heating may not be the best thing to promote housing retrofit due to the above reasons.

IV. DISCUSSION

It can be argued that the government policies regarding climate change are basically stimulated by the economic advantage of going for sustainability. The Stern report was published in 2006 to highlight the economic cost of not being sustainable. It recommended to adopt sustainability now to avoid expensive remediation measures in future [72]. The simple idea is that being sustainable is profitable. When the government was triggered by this report about the economic viability of sustainability, the Climate Change Act of 2008 [14] was passed. In terms of housing sector decarbonisation, it can be argued that government policies and actions are most of the time based on short-term popular measures. For example, after the Stern Report 2006, the net zero homes standard was passed [51]. However, it was withdrawn later. The same is going to happen for the mandatory withdrawal of gas boilers from the market from 2035 and minimum energy efficiency standards for the privately rented sector [48]. Even the opposition political party is hesitant to reserve a budget for green energy from their expected government subject to

winning the election [56]. However, the government was seen to be trying short-term measures to keep the energy prices down during the years 2022 - 2023 from an energy price guarantee to GBP 400 energy bill subsidy.

There are positive actions and policies with regard to housing retrofit from time to time. For example, the introduction of PAS 2030/2035 standards to streamline the housing retrofit process, giving a five-year VAT concessionary period for retrofit products and services, and introduction of government grants for housing retrofit can be noted as good moves from the government. However, as the above review describes, there are still inconsistencies observed in the government policies and actions which can undermine the progress of housing retrofit in the UK. These inconsistencies are reflected in the existing poor progress of retrofit.

An integrated and coherent set of policies and investments are critically required for a transition to net zero. Further, these policies and investments are to be communicated to the consumers and voters [73]. The importance of a whole system approach, covering multi-disciplinary aspects is a prerequisite for the transition to sustainability. This can include society, culture, industry, technology, economy and many more [74, 75]. As far as the housing sector's decarbonisation is concerned, there is no exception. The above analysis has shown several inconsistencies in government policies and actions related to housing retrofit.

In general, the inconsistencies are mainly related to the absence of a long-term strategy and clear commitment to the promises. Even the strategic directions such as net zero homes, minimum energy efficiency standards and gas boiler phase-out were diverted. Rather than focusing on long-term solutions, the government seems to be focusing on short-term popular decisions to entertain the voters. For example, subsidizing the energy bills. Further, while the government is trying to spend money on retrofitting measures with grants and subsidies, they focus on earning money on retrofitting by charging taxes. For example, charging VAT on retrofit products and services. Currently, there is a government subsidy to reduce the cost of retrofit professional training programs [76]. A retrofit assessor + domestic energy assessor course total fee is GBP 1200 and the government subsidises the cost by GBP 720. However, they further tax the balance of GBP 480 at 20%.

In addition to that, the government seems to be depending on innovations to solve problems. Innovations will be important, and it is better to acknowledge the government's focus on the "No regrets" strategy. However, it is better to have a strategic plan rather than a hope.

V. CONCLUSION

The study expected to identify the inconsistencies of the government policies and actions by way of a critical review. Accordingly, eight key inconsistencies were identified and reviewed. However, the list can be exhaustive, and the above-mentioned inconsistencies can be a fraction of it. The importance of the study is to highlight some of the prominent inconsistencies in policy and actions of the UK government. It

can be concluded that the government has taken some steps to promote housing retrofit in the UK. However, these measures do not seem to be strategic, and the government has changed their stance from time to time focusing on short-term priorities. Considering the facts, it is important to go for a systematic multidisciplinary approach for housing retrofit, with a clear trajectory to achieve net zero in the housing sector by 2050. Unfortunately, the literature suggests that there is no such strategic approach, and it is unlikely to achieve housing sector decarbonisation by 2050 according to the existing progress and pathways. "Government is not the solution to our problem, government is the problem." Ronald Reagan, Ex-president of the USA [77].

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