

RAF 063/2122 Trigger Points for Installing Low Carbon Heating and Energy Efficiency Measures

Which trigger points can effectively prompt consumers to take up energy-efficiency and low carbon heating measures in their property?

Completed by Basis Social, London Economics, Cambridge University and UCL for the Department for Energy Security and Net Zero prior to the general election in the United Kingdom in July 2024.

As such, any references to government policies, commitments, or initiatives may reflect the stance of the previous administration and were accurate at the time of fieldwork and writing.

Views expressed in this report are from the relevant research agencies, based on data collected from research participants and other evidence, and not necessarily those of the UK government.



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Executive summary

Trigger points are moments of opportunity where people are most open to change and can be motivated to act. In the context of the UK government's net zero ambitions, harnessing the power of trigger points, such as moving home, has potential to maximise the impact of communications and policies to decarbonize the UK's housing stock, as consumers may be most receptive to such messages and interventions.

This exploratory research aimed to identify which trigger points will be effective in prompting consumers to think about, plan for and install energy efficiency measures and low carbon heating, and which will be less effective or lead to a negative outcome. The project comprised a Rapid Evidence Assessment (REA) of 58 published research papers and reports, 15 stakeholder interviews and group discussions with a total of 8 owner occupiers and 8 landlords.

While published research on the effectiveness of trigger points is limited, the REA identified five categories of trigger points associated with low carbon heating or energy efficient measures. The categories were: emergencies (e.g., a boiler breaking down, damage to property); life stages or events (e.g., moving home, retirement); social influences (e.g., professional advice) societal or environmental contexts (e.g., cost of energy) and quality of the living environment (e.g., home renovations).

No trigger point identified in the REA immediately results in a change in behaviour. Rather, trigger points represent moments when there is greater salience of a need to make changes to the fabric of a property and/or how it is heated. Whether a trigger point was effective depended on the extent to which low carbon heating and retrofit measures were seen as good options in this context. Across the five categories, two decision contexts appear to influence the effectiveness of trigger points: those associated with immediate needs and those which are future facing and involve planning.

Trigger points characterised by an immediate need - for example a boiler breaking down - are less effective at prompting consumers to consider retrofit and low carbon heating measures. This is because consumers tend to turn to quick, easy solutions (such as replacing with a like-for-like boiler). Additionally, these are stressful moments, with people's 'cognitive capacity' focused on fixing the problem with less consideration given to factors such as long-term energy costs or environmental impacts. For similar reasons, energy efficient measures such as insulation were not likely to be considered at this time. Despite this, enabling consumers to plan more effectively for such trigger points, for example when a boiler is coming to the end of its life, could have potential and was especially motivating for landlords.

Trigger points characterised by future needs - for example purchasing a property – were seen by consumers as more effective moments to consider retrofit and low carbon heating measures. This is because there is more time to reflect on decisions and make plans, and (at certain triggers points) there is also more money available to make such changes. For owner

occupiers, in addition to moving home, undertaking renovations and retirement were identified as promising trigger points. Savings on energy bills, as well as the warmth and comfort of a home, were key considerations for owner occupiers. For landlords, buying a new property or tenants moving out was seen as effective trigger points for considering changes to the property. The extent to which a retrofit or decarbonisation measure increased the property value and/or the potential to charge more rent were important considerations for landlords.

Professional advice from engineers and installers were raised by several stakeholders as an important trigger point, and often worked in tandem with moments like buying properties or installing a new boiler. Ensuring tradespeople can advise on and fit low carbon heating and retrofit measures will be essential to drive uptake.

Finally, trigger points do not operate in isolation, and many other factors need to be in place for a trigger point to be effective. These include building consumers' capability (through information and advice on the measures available), opportunity (through financial support to mitigate the upfront costs, and access to informed and skilled installers) and motivation (though a stable and long-term policy and strategy around retrofit and heating).

This project was exploratory and only involved limited primary research. While activating trigger points has promise, future research is needed to maximise the value of such an approach. Two trigger points, each with different characteristics, stand out as candidate areas to explore further:

- **Buying a property.** Research will be needed to understand the customer journey of owner occupiers and landlords in detail, to identify the most effective moments for change and explore how intermediaries (for example, estate agents, solicitors, mortgage brokers) can support this process.
- **Annual boiler inspections or home care energy services.** Research is needed to understand the factors influencing the willingness of consumers to proactively plan for their future heating needs, the relative attractiveness of heat pumps in this context, plus the features of insurance products that could enable such decisions. Our research found that this planning was more likely to influence landlords than owner occupiers.

Introduction

The UK government plans to decarbonise the UK housing stock to reach net zero carbon emissions by 2050. Two key areas of focus are improving energy efficiency and transitioning to low carbon heat in homes. To meet these goals, households will need to adopt, at scale, a host of measures, which could include loft, wall and floor insulation, low energy lighting, solar panels, and heat pumps.

To enable this transition, the Department for Energy Security and Net Zero (DESNZ) wants to consider the potential of using a ‘person-led approach’, which starts from the point of looking at what people are already doing in their lives and works with those opportunities. This approach is grounded in behavioural science and aims to motivate people to act when they are most open to change – at moments of opportunity known as ‘trigger points’. A trigger point, for example moving home, is specifically a moment where people may have greater capability, opportunity and motivation to make what are often significant investments to their property and/or heating systems.

Trigger points are relevant for both policy and communications, by helping to identify optimal moments to provide communications as well as to target policy interventions at moments where consumers are most able to act. However, literature around trigger points in the context of decarbonising homes is limited, and the area as a whole is under-researched. Additionally, there has been little evaluation of what makes a trigger point effective or whether all trigger points are effective.

In November 2022, DESNZ commissioned Basis Social, London Economics, Cambridge University and UCL to explore how trigger points can be leveraged to encourage consumers to take up energy-efficient and low carbon measures in their property.

Research questions

1. Which trigger points will be effective in prompting consumers (landlords and owner occupiers, both on and off the gas grid) to think about, plan for and install energy efficiency measures and low carbon heating?
2. Which trigger points won't be effective, or worse, could lead to negative outcomes?
3. What makes a trigger point effective or ineffective?
4. How may effective trigger points differ for different groups of consumers?

Methodology

To research the potential of trigger points the following four-stage method was adopted. Each stage was designed to build upon the previous findings.

Stage 1 involved a rapid evidence assessment (REA) to identify and synthesise the existing literature on trigger points for low carbon heating and energy efficiency measures. The REA was conducted in December 2022. The REA search identified 435 academic papers. Through abstract screening, 51 academic papers were included in the analysis. An additional seven papers from the grey literature (identified directly via web search and from DESNZ rather than screened) were also reviewed.

Stage 2 involved interviews with 15 academic experts, stakeholders and consumers to help fill the gaps in evidence identified during the REA. Interviews were conducted during January and February 2023.

The interviews were structured to explore respondents' views and experiences surrounding different trigger points and sought to identify evidence as to the effectiveness of different trigger points.

The interviews involved the following:

- Four academics, with expertise in energy policy and consumer behaviour.
- Two consumer organisations.
- Two landlord organisations.
- Two organisations working on behaviour change and communications.
- An energy industry body.
- Four consumers (landlords and owner occupiers).

Stage 3 involved mini-group discussions with consumers to 'test' themes regarding motivations and barriers emerging from the research. To aid discussion, trigger points were grouped into two main decisions contexts – immediate and future decisions - which were identified in the REA and interviews as influencing their effectiveness. In total, four mini groups were held, two with landlords and two with owner occupiers. Participants were recruited primarily in terms of whether they had previous experience of installing low carbon heating and/or energy efficiency measures in their properties (see appendix for sample details and characteristics). Soft quotas were also used for gender, age group, and location, to ensure a spread of these characteristics across the sample. Participants were recruited through a panel by a specialist qualitative fieldwork agency. A screening survey was used to ensure participants were eligible to take part. Discussion groups were held in February and March

2023 and explore how motivated these different audiences were to act to install low carbon heating or energy efficiency measures at various trigger points.

Stage 4 involved reporting and outputs. Findings from the REA were combined with the interviews and discussion groups. Throughout all the research stages, findings were analysed to a common code frame using a proprietary qualitative analysis platform. The full methodology can be found in appendix 1.

Limitations of the research

The purpose of this project is to understand what research exists on trigger points in relation to energy efficiency and low carbon heating, as well as discuss their potential effectiveness with stakeholders and consumers. The research is exploratory and while consumers have been directly engaged in the research, samples sizes were small, and caution should be taken when interpreting findings.

In addition, previous research on trigger points is limited, especially in the context of low carbon heating and energy efficiency measures. The term 'trigger point' is not routinely used in the literature and where specific trigger points, such as moving home, are discussed, there is limited direct evidence on their effectiveness. Consequently, while the REA identified a range of possible trigger points, their potential as enablers of behaviour change was not determined from this research stream. This was due to a lack of papers specifically looking at the effectiveness of trigger points at changing behaviour in the context of energy efficiency and low carbon heating. Instead, this was assessed through discussion with stakeholders and consumers.

Furthermore, the time available for the REA was limited, and more time to conduct in-depth analysis may have yielded more evidence relating to trigger points, for example by broadening the search protocol, or by searching additional bibliographic databases.

Trigger Point Classifications

Identified Trigger Points and Classifications

In total, 21 trigger points were identified in the context of low carbon heating and energy efficiency measures across the 51 papers reviewed in the REA. These are listed below, based on the number of times they were cited in research (see Table 1). Most of the studies were conducted in the UK, Europe or the US and ranged from 2009 to 2022. The study designs were mostly made up of systematic reviews, qualitative and survey-based studies. There was very little evidence of experimental studies in this context. Based on the evidence, it is not possible to conclude any relationship between frequency a trigger point occurred in reviewed papers and its effectiveness. However, it does give insight into the range of potential trigger points.

Table 1. Frequency of trigger points identified in the mini-REA

High frequency (>10)	Medium frequency (5-10)	Low frequency (<5)
Moving home	Working from home	Children leaving home
Home renovations (functional, cold/draughty house)	Energy price change	Moving in with partner
Home renovations (emotional, aesthetics)	Retirement	Children moving back home
Policy instrument/ change	Having a child	Bereavement
Social influence/comparison	Previous experience with energy efficiency measures	Inheritance
	Pressure from tenants (for landlords)	Income increase
		Professional advice
		News stories
		Heating loss
		Boiler breaks

Trigger point classification

This range of trigger points can be categorised into moments with related characteristics - for example, those with similar consumer needs, or similar changes in circumstances. Table 2 provides a summary of the trigger points identified in the REA classified into 5 categories.

Table 2. Trigger point classification

Trigger point classification	Trigger points (all)	Trigger points (landlords only)
Emergencies	boiler breaks heating loss refurbishment after damage to property	
Life stage or events	moving home moving in with partner having a child income increase children leaving home children moving back home retirement bereavement inheritance working from home	tenant moving out
Social/identity	seeing others complete a renovation or install measures peers/word-of-mouth professional advice	what other landlords offer
Societal and environmental context	energy price change policy instrument/change news stories	
Quality of living environment	home renovations (emotional, aesthetics) home renovations (functional, cold/draughty house)	pressure from tenants

previous experiences of
measures

Trigger point classification validation

This classification of trigger points was sense checked in stakeholder interviews. The categories were seen as coherent and the list of trigger points was broadly viewed as comprehensive, though three other trigger points (changes to an individual's health, mortgage renewals, and seasonal changes – for example the coming of winter) were also identified by stakeholders.

Stakeholder views on the importance, salience and potential effectiveness of these different categories of trigger points were as follows.

Emergencies

Emergency trigger points were discussed widely amongst stakeholders, with a boiler breaking mentioned very frequently, and only very limited mentions of emergencies caused by damage to a property. Overall, emergencies were generally seen to have a negative impact on consumers' willingness to consider low carbon heating or energy efficient measures due to the need to address the problem quickly and a desire to go with what is already known. For example, in the context of a boiler breaking, there was felt to be little time or cognitive capacity to consider replacing the appliance with an unfamiliar technology, such as a heat pump.

“Tenants do not want to hear that we are delaying the repair because we are considering low carbon heating measures” (Landlord – 4).

“You are not in a particularly welcoming space to start considering new plans and what the future might be.” (Creative – 6)

One stakeholder hypothesized that water damage could be another emergency trigger point, particularly in relation to encouraging installing wall insulation, or other energy efficient measures, during repairs. For example, in the context of a flooded property, whilst the property needs to be repaired quickly, there is less urgency to such moments as properties also need to dry before works can be undertaken. While this could provide greater time (physical opportunity) to consider retrofit measures, motivating consumers during moments of stress was seen as more challenging.

Life stage or events

Generally, moving house and undertaking renovations were regarded as potentially effective trigger points across the interviews in relation to life stage or events, particularly for installing energy efficiency measures (see section 'Moving home' and 'Renovation'). For example, one

owner occupier mentioned they had installed loft insulation because they were renovating their loft (Owner Occupier – 11).

Several interviews discussed retirement as a trigger point. They suggested the combination of having a lump sum of money and spending more time at home may prompt retirees to consider installing energy efficiency measures:

“Retirement is significant. Obviously, it's quite a big lifestyle change, but the economics of being at home all day are pretty massive and they do have a pretty positive impact on things like having solar panels installed, having better energy efficiency, because it means any investment in energy efficiency will pay back faster, any investment in solar panels will pay back faster.” (Academic - 1)

Engaging with consumers in the years immediately prior to retirement was suggested as an idea to encourage them to make energy efficient changes in preparation for their income to become lower and fixed (Policy org – 3). One stakeholder also suggested physical adaptations required for people as they get older might trigger the consideration to install energy efficiency measures (Academic – 9).

Having a child was not mentioned widely as a strong trigger point and only one owner occupier discussed this experience in the context of energy efficiency of their house. Specifically, heating a home comfortably for a new baby had made energy costs more salient, and retrofit measures were considered in this context (Owner occupier – 14).

Landlords indicated that while a tenant moving out was not generally a trigger point to consider installing energy efficiency or low carbon heating measures, it was a trigger to undertake disruptive renovation work. Increasing the awareness of such measures in these moments could have potential, though other barriers (predominately financial) would need to be addressed.

In terms of other life stage or event trigger points beyond those identified in the literature, one stakeholder also mentioned mortgage renewal as a potential trigger point.

Social/identity

Social influences were noted as key driver for adopting energy efficiency measures in several studies. These highlight the importance of social networks increasing awareness of energy efficiency measures in the home, and role of peers as influential messengers. For example, Broers et al (2019)¹, who interviewed adopters of energy renovation measures, found that 50% of these interviewees actively advised people in their social network about energy renovation measures. Social norms were also a significant influencing factor when thinking about and planning renovations.

¹ Broers W.M.H., Vasseur V., Kemp R., Abujidi N., Vroon Z.A.E. (2019). Decided or divided? An empirical analysis of the decision-making process of Dutch homeowners for energy renovation measures. *Energy Research & Social Science*, 58.

In fieldwork with consumers, while there were no specific examples given of peer influences acting as a trigger to adopt low carbon heating or retrofit measures, the principle was seen as potentially influential – though insulation or heat pumps, for example, were not readily associated as status symbols (compared to other consumer goods).

While landlords did not engage with others in the sector as frequently as owner occupiers engaged with friends and neighbours, there are forums and meetings where they can be influenced by discussions about energy efficiency measures that other landlords have installed (Landlord – 8). One landlord also noted that seeing solar PV being installed on nearby properties has encouraged them to follow suit as they did not want to ‘fall behind the market’ (Landlord – 12).

Several stakeholders indicated that professional advice was a trigger point, particularly from trusted engineers and installers. Several landlords, for example, indicated that there could be potential knock-on effect whereby installing an energy efficiency measure in one property would lead them to install in their other properties. Building relationships with qualified tradespeople was also seen to have an amplifying effect, as it removed additional friction points associated with installation of measures.

However, it was noted that professional advice could also act as a barrier with professionals discouraging installing certain measures due to their own views, lack of knowledge or restrictions in terms of skill and availability. For example, an academic noted that heating engineers often know one or two boiler brands very well, and were likely to routinely recommend these rather than undertake research to advise on or install a new technology (Academic – 13).

Another stakeholder suggested that professional advice is something that facilitates installation at other trigger points but should not be considered it a trigger point itself (Academic – 13).

Societal and environmental context

The cost of energy was discussed by several stakeholders as a trigger point which has led to people thinking more about energy efficiency measures. One stakeholder mentioned that more people have adopted lower cost energy efficiency measures this year in response to the energy crisis, for example cavity wall insulation (Policy – 2). An owner occupier also mentioned that news stories about increasing energy bills prompted them to install energy efficiency measures (Owner occupier – 11).

Several stakeholders mentioned that legislation or mandatory measures were important, for instance the minimum Energy Performance Certificate (EPC) requirements for landlords to let their properties. Similarly, policy announcements were mentioned as a trigger point, for example one stakeholder mentioned that the announcement of the Green Homes Grant did spike an interest amongst households for retrofit measures (Policy 7).

A stakeholder also mentioned changes to the seasons as an environmental trigger point, with communication around energy efficiency measures more likely be salient in the autumn and the winter months (Creative – 15).

Quality of living environment

In interviews, stakeholders discussed trigger points related to the quality of living environment less than other categories and, other than refurbishing a home, did not identify them as being particularly salient or effective. A couple of stakeholders considered that the desire to improve the quality of the environment was linked to life stage and events such as moving house and renovating.

“I have examples of where people have moved into a new home, but the home feels quite cold. So then they've looked at what they can do to upgrade it”
(Academic – 9).

One stakeholder also raised health triggers, such as those linked to damp or living in a cold property, may lead people to consider installing measures (Policy org – 3).

There are different ways these trigger points can manifest themselves for landlords. For example, pressure from tenants may be related to desire to increase the quality of their environment or for reasons related to cost of energy to heat a poorly insulated property.

Landlords did indicate that tenant requests might be a trigger to install retrofit measures in the property, though expected these to be ‘straightforward measures’ such as loft or wall insulation, and there was a lack of awareness amongst landlords (and their tenants more generally) of low carbon heating measures such as heat pumps (Landlord – 8).

This notwithstanding, one landlord had installed a heat pump following a request from a tenant. The tenant had had a heat pump in a previous property and wanted to continue living with one. The landlord mentioned that the property needed a new heating system and was keen to keep a good tenant (Landlord – 12).

Overall, landlords noted that it was unusual for tenants to make requests related to installing new measures in the property as their tenancies are usually relatively short term. However, most landlords said they were happy to listen to tenant requests ‘within reason’. For expensive measures, there would need to be a commercial return – either in terms of an increasing the asset value and/or an ability to charge higher future rents. The potential to split costs with tenants was also mentioned by one landlord.

Trigger point effectiveness

In general, trigger points were considered by stakeholders to have potential.

They were seen to represent moments in time where individuals’ context or circumstances change. At these moments, there is scope to increase the awareness and salience of low

carbon heating and energy efficiency measures, as well as the range of measures under consideration.

“These moments completely disrupt the environment in which your habitual behaviour is situated. That is basically the only time you can do it.” (Creative – 6).

However, converting awareness or receptiveness of various measures into behaviour was seen as very challenging, and was contingent on both the decision context and overcoming other barriers (costs, disruption, finding a contractor and so on).

“At the moment, none of the trigger points are especially effective as, while they certainly identify moments where people do re-evaluate their behaviours, it is not easy for someone to convert that into doing something” (Policy – 7).

From the REA and interviews, there appear to be two broad types of decisions contexts that emerge from trigger points and give insight into subsequent behaviours:

- Trigger points that give rise to **immediate needs and action**. These are characterized by quicker responses and a tendency for consumers choosing familiar or easy to install measures. These include a boiler breaking down, experiencing cold due to a failure in draft proofing or insulation, damage to property including structural damage or flooding, and (for landlords) policy/regulatory changes as well as pressure from tenants.
- Trigger points that give rise to **future needs and actions**. These are characterized by reflective processes including greater planning and an openness of consumers to consider a wider suite and more disruptive measures. They are common to life stages or events (moving house, having a child, retirement, working from home), but also social and aesthetic factors that influence consumer choices.

The relationship between these decision contexts and various trigger points was discussed in depth in the mini groups with owner occupiers and landlords. The decision contexts are explored in depth in the following sections.

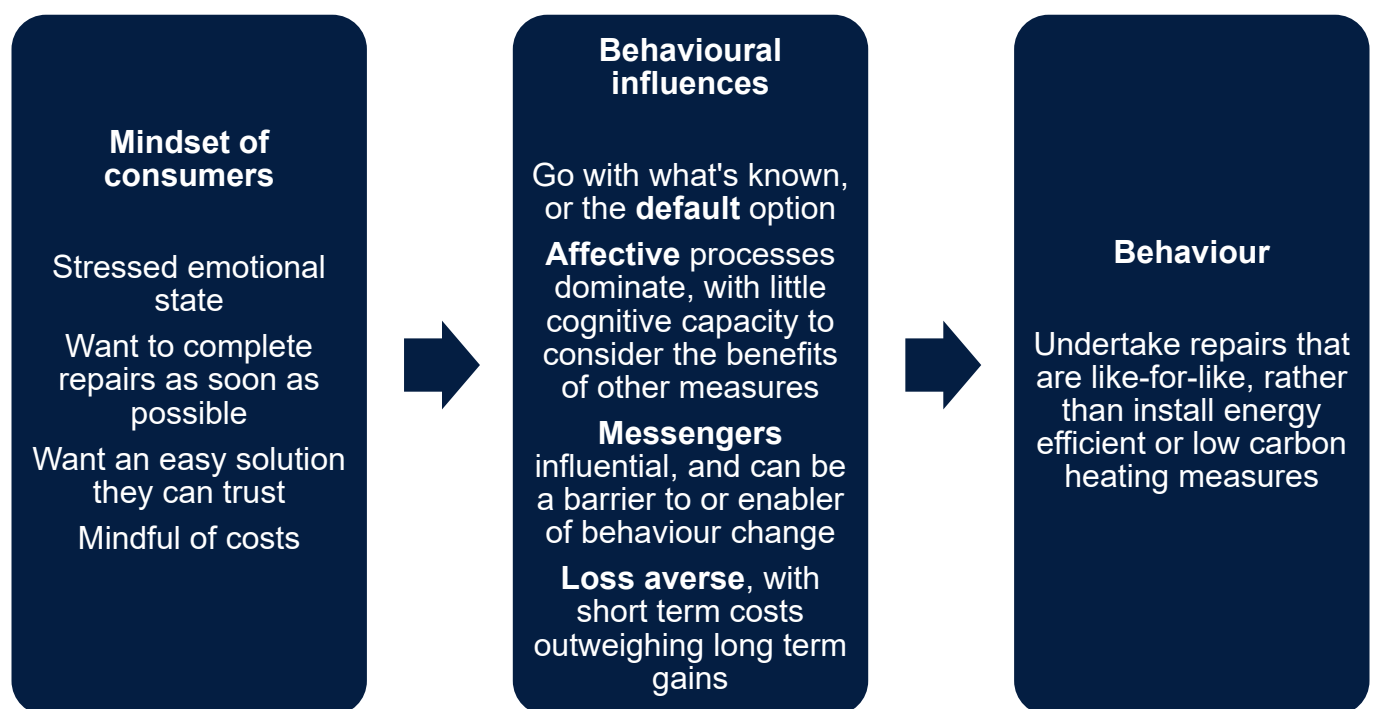
Immediate vs Future Decisions

Much of the evidence used in this section is from the mini discussion groups, where the classifications and decision contexts explained above were tested with consumers. The sample sizes for these groups were small, and care should be taken when interpreting the findings presented.

Immediate decisions: overview

Trigger points characterised by an immediate need – such as a boiler breaking down or flooding in the property – while prompting swift action, can reduce the likelihood of implementing energy efficient or low carbon heating measures, as illustrated in figure 1.

Figure 1. Factors influencing the adoption of energy efficient and low carbon heating during trigger points associated with immediate decisions.



For example, from the REA, a qualitative study of landlords found that despite stating an openness to consider low carbon heating measures, replacements at the point of boiler failure were with gas condensing models due to familiarity, time pressures, and convenience².

² Lang, M., Lane, R., Zhao, K. and Raven, R. (2022) Energy efficiency in the private rental sector in Victoria, Australia: When and why do small-scale private landlords retrofit? Energy Research and Social Science

However, financial support, together with timely information, may be important in supporting the consideration of low carbon heating measures during such moments. In a paper evaluating the Renewable Heat Incentive (RHI) scheme, it was found that most of the general population (70%) install new heating systems because the old one needs replacing. Reasons include that the current system is: 'nearing end of life or ineffective' (31%), 'broken down' (30%) or 'not working properly' (9%)³. However, only 32% of owner occupier RHI applicants installed a renewable heating technology because they needed to replace their system. Rather, owner occupier RHI applicants were more motivated by 'funding available' (36%) and 'refurbishing' (33%). The report also identified installers as the most important source of information for owner occupiers along with funding being a key motivator for RHI applicants⁴.

Other trigger points associated with an immediate need, such as a cold or draughty house, were also associated with 'simple and familiar' energy efficiency measures such as loft insulation. Again, timely information to homeowners on the energy performance of their home (specifically that the home is poorly insulated) can lead them to pursue energy-efficient renovations⁵.

Water damage to a property, such as flooding, while presenting an immediate need, is also characterised by a delay before repairs can be undertaken – as the property needs to dry out. For one stakeholder, this period represented a moment of opportunity for consumers to consider measures such as wall insulation⁶.

Overall, from the interviews and discussion groups, there was broad consensus that emergency trigger points are less effective in encouraging the uptake of energy efficiency measures or low carbon heating. This is because consumers tend to turn to quick easy solutions, and are not in the frame of mind to consider long-term social (e.g. environmental) or financial (e.g. lower bills) goals.

"I think given the urgency; you just think just fix what's there. You need someone to come out and fix the problem in about 3 hours. You can't have no heating while you have a full different setup put in [a heat pump]. You need heat now"
(Consumer – 14)

"If you construct a moment in which there was far too much cognitive load, and far too little understanding of what might happen, you'd be hard pushed to find a better moment than that [an emergency trigger point]. And then to get into that

3

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/642103/RHI_evaluation_synthesis_-_2017.pdf

⁴ Ibid

⁵ Moore, David (2010) The client perspective on factors in the retrofitting of sustainable technologies to traditional rural homes in North East Scotland

⁶ While flooding was not explored in depth, the Environment Agency has developed guidance concerning retrofit measures to prepare properties for flooding (see: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/451622/LIT_4284.pdf). Further research is recommended to explore the potential effectiveness of flooding as a trigger point for insulation measures.

space and say, hey, by the way, why don't you take advantage of this [a heat pump], and do something else. Even if you can get that message into that noise, it's really hard for it to be considered.” (Creative – 6)

In particular, a boiler breaking tends to limit the consideration of other options, and can lock consumers into gas boilers for a further ten years.

“[on a boiler breaking] But it does put pressure on, obviously, if you're in that situation that you usually find out your boiler is broken when it's cold.” (Creative – 6)

“Well, I think there's sort of the class of trigger points where there is the most risk for locking in emissions, locking in higher energy bills for the longer term are those emergency trigger points. When people are in state of distress, they want the heating back on. It is easier currently to just ask for a new gas boiler to be installed, and then it's installed for ten years, it's still emitting CO2.” (Policy – 7)

The next two sections explore how trigger points that require immediate decision-making manifest for both owner occupiers and landlords, as well as considering how these trigger points relate to specific energy efficiency or low carbon heating measures.

Immediate decisions: owner occupiers

In the discussion groups with owner occupiers, emergency trigger points were not seen to be effective in encouraging installation of energy efficiency and/or low carbon heating measures.

When considering a boiler breaking down in winter, as found in the REA, the need for speed and going with what was already known was paramount for owner occupiers. Participants were focused on fixing the immediate problem (getting the house warm), rather than thinking about future needs.

“The last thing on your mind is I will find an energy efficient boiler or heat pump. In that scenario, all you're thinking is, I need to keep my kids warm, I need to keep the house warm, I need to stop the pipes from freezing over. So in that scenario, energy efficiency and helping the environment would probably be the last thing on my mind at that point in time.” (Owner occupier discussion group - 4)

“I think you could be quite rash and make a quick decision just to get heat, rather than thinking what's the most pragmatic solution in that particular scenario.” (Owner-occupier discussion group - 3)

A couple of owner occupiers mentioned that they would consider an energy efficient boiler as a replacement, but this would ultimately depend on the cost. One owner occupier, however, did install a heat pump due to their oil boiler breaking down. They would have installed a like-for-like oil boiler but were facing additional costs, and a grant was available for a heat pump. Here, the owner occupier was financially motivated to install their heat pump:

“So we started looking to get the oil boiler changed. But fortunately, because of regulations where the current boiler was sitting, it was no longer able to sit there... So, in terms of cost, it was looking at around about £7,000 to £8,000 to replace the oil boiler. Doing a bit of research, air source heating pump include normal radiators changing, cost £15,000. Because of the Ofgem [BEIS Renewable Heat Incentive] scheme at the time, which is now changed, it was working out that I would get it somewhere in the region of £13,000-14,000 back from over a period of seven years... It kind of was a no brainer for me.” (Owner occupier discussion group - 3)

One owner occupier in the discussion group mentioned that, in response to the scenario of the boiler breaking down in winter, they would not be concerned as they have insurance to replace their boiler with a similar model. This highlights that current market factors may have a negative impact on installing more efficient measures, as having boiler insurance can reduce the need to consider other measures.

In interviews, a couple of stakeholders mentioned that, while emergencies such as the boiler breaking are largely unexpected, there is scope to anticipate when failures might occur based on age of the boiler and when people turn the appliance back on after the summer (with a peak in failures in October). Therefore, there is scope to facilitate owner occupiers to lay the groundwork and put a plan in place for when the boiler fails, which presents an opportunity to consider other measures in advance, as well as prepare financially and logistically:

“You could do quite a lot of things to lead up to the point and you could even offer people a plan so if your boiler breaks, it's fine because we've got this plan in place and we're going to do that as we agreed.” (Creative – 6).

This scenario was tested during the owner occupier discussion groups, whereby participants were told “a year before the boiler breaks, you had it serviced and the person fixing the boiler told you it was getting old and likely to need replacing in the next couple of years” and asked how they would react. All participants in this group responded that this would not influence them to consider replacing their boiler early or consider alternative heating sources in preparation for their boiler breaking.

“I don't think I would be hugely influenced by it, that period of time ahead, if I'd heard about it back then. Because I think it's one of them things that when that happens, if you're told that, like I said, unless you've got those kind of funds sitting there to do something at that time, I think most people, you wait for it to go wrong, don't you?” (Owner occupier discussion group – 4).

Emergencies and specific energy efficiency or low carbon heating measures for owner occupiers

While there was some evidence that presenting more information on heat pumps made occupiers generally more receptive to them, costs and feasibility were significant barriers during moments of emergency.

Several owner occupiers reported on energy efficiency measures they had installed to resolve cold or draughty conditions in their home in response to an immediate problem, and in general there a preference for insulation measures over low carbon heating measures (e.g., heat pumps). The reasoning behind this was that they first must improve the ways the property retains heat before generating heat in a different way:

“You need to sort out where you're going to lose the heat from. It's no good generating it if it's just going to go out the walls or out the roof.” (Owner occupier discussion group - 3)

While several owner occupiers expressed an interest in insulation to increase warmth and comfort in their home, they also mentioned that in response to this year's winter and the energy crisis, they have opted for reducing their heating use and purchasing hot water bottles and blankets, as it was a far cheaper and easier solution.

Immediate decisions: Landlords

As discussed above, emergency trigger points tend to lead to like for like replacement as people are time pressured and focus getting the emergency sorted rather than consider the longer-term benefits of low carbon heating or energy efficiency measures. While this is also true for landlords, with there are other influences on their decision.

For landlords, a consideration at emergency trigger points (raised during the interviews) is what can credibly be communicated to tenants after they report an emergency. Tenants don't want to be told that the landlord is considering low carbon options when they have no heating or hot water and therefore the scope for considering these measures is reduced.

“Yeah, particularly with landlords actually, if you've got your tenants calling you every hour because they've got no heating in the depths of winter, they don't want to be told that you're assessing future technologies.” (Landlord organisation – 4)

One way to potentially overcome this was discussed by one of the interviewees from a landlord organisation. They wanted to encourage landlords to plan so that when an emergency trigger point occurs, they are prepared and have considered their options.

In the discussion groups, landlords were more receptive to planning than owner occupiers, as they generally think about their properties as a long-term investment. Annual boiler checks were considered good opportunities to educate landlords about new technologies, potential policy changes, or financial schemes as they give landlords time to consider and work out the costs vs the benefits.

“[if knowledge of a boiler breaking soon was conveyed by an engineer, would this help them prepare when the point of emergency does come] Yeah, for me it definitely would be. Especially like if you say in the example it's going to be five to ten years, it's going to become obsolete, then it's definitely something I'd consider

at the time and put more weight into getting done.” (Landlord discussion group – 2)

Landlords with larger property portfolios were broadly more willing and able to plan than those with smaller portfolios, and also had greater access to capital to invest in the property for the long term.

“It's also our whole attitude is we always want to replace and not have aggro and have call outs, anything like that. So we try to stay on top of things so we don't have to have sort of repairs or emergency responses to the stuff.” (Landlord discussion group – 2)

Landlords with smaller portfolios would wait until the boiler has broken before thinking about replacing it to maximise the return on their investment in the old boiler.

“Usually I just wait. I try and keep it going as long as possible because it's the whole cost working it out.” (Landlord discussion group – 1)

Knowing when an emergency trigger point may occur is key to planning and it presents an opportunity to lay the groundwork with communications to encourage landlords to think ahead and plan what they are going to do when the emergency does occur.

“It's in the first couple of weeks of October. It's when everyone puts their boilers on. You actually can map a kind of flow from north to the south of the country about who's going to need boiler repair.” (Creative – 6)

Emergencies and specific energy efficiency or low carbon heating measures for landlords

During the discussion groups, after heat pumps had been explained, there was little appetite among landlords for installing them during emergency trigger points (such as a boiler breaking). The upfront cost of heat pumps was enough to put them off, and even if grants were offered to help it was expected that they would take a long time to apply for and therefore were not applicable for emergency trigger points.

“[on heat pumps] for me personally, I'd only be interested if I got the grant to make it feasible, so I assume that's going to take months to put in the application and apply and go through and things like that. So in an emergency, I don't think it would work in that respect” (Landlord discussion group – 1)

The potential need to install other measures (such as new radiators) alongside a heat pump, as well as the disruption its installation can cause, also reduces its appeal during an emergency trigger point. This concern over additional friction points such as costs and hassle were common findings amongst landlords.

“[if they were to install a heat pump] So I think personally, I'd like to do it while the property was vacant. Empty. Sorry. And then obviously gives the chance to get

the property up and running, ready for the next one without any sort of stress or panic or worry from the tenant” (Landlord discussion group – 2)

Tenant requests in response to immediate need trigger points were viewed in the context of how expensive the measure was to install. Energy efficiency measures were generally seen as less expensive than heating, with cheap measures (such as draught excluders) considered first.

“[in response to a tenant saying they are cold] I might consider, like, say, is there some sort of installation [i.e. insulation] that I could do rather than something expensive like the boiler or the central heating? Maybe it does need insulating or the draught excluder” (Landlord discussion group – 2)

Other energy measures such as insulation and solar PV panels are less conducive to emergency trigger points and so the focus of the conversation was on low carbon heating measures.

Future decisions: overview

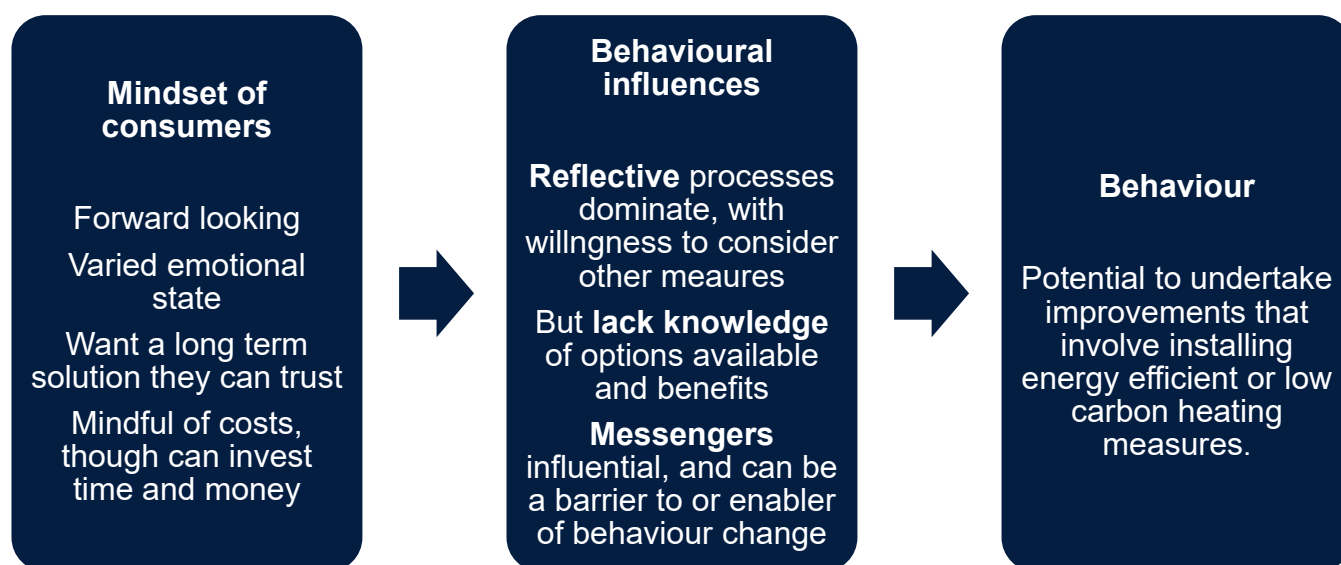
Trigger points associated with longer term planning can provide space to consider a wider range of measures. In the literature reviewed, there were a greater variety of trigger points characterised by future needs as opposed to immediate needs. These variously linked to life events, renovations for aesthetic reasons, and social comparisons.

While not exclusively, these types of trigger points were more readily associated with the adoption of energy efficient measures in the consumer groups, though heat pumps and solar PV were also mentioned. There are three reasons why this was the case.

First, there was greater awareness of insulation measures compared to low carbon heating measures such as heat pumps. Second, these trigger points led consumers to consider improvements to the warmth and quality of their living environment, which in turn was more associated with insulation than upgrading the heating system. Third, some owner occupiers suggested that energy efficient measures would be prioritised as part of a longer-term plan whereby they would first want to manage the ability of the home to retain heat (e.g., through insulation measures) and then consider more efficient ways of generating heat (e.g., heat pumps).

Figure 2 summarises how trigger points associated with future decisions can influence the adoption of energy efficient and low carbon heating.

Figure 2. Factors influencing the adoption of energy efficient and low carbon heating during trigger points associated with future decisions



Moving home was one of the most common trigger points identified in the literature and associated with a range of energy efficiency measures, and, to a lesser degree, heating measures, including heat pumps. Changes in occupancy and tenure can provide a ‘window of opportunity’ for households to retrofit their houses and heating systems. Other studies have also noted the ‘period of adjustment’ post moving house can influence thinking about installing energy efficiency measures. People imagine what their home will be like before moving in and the ‘period of adjustment’ represents the period that perception meets reality. This is relevant for policy as despite moving home being a trigger point, the perception of energy efficiency needs may only arise during the ‘period of adjustment’ (e.g., if someone moves home in the summer, they may only realise their need for energy efficiency in the winter). Further, for moving home to become an effective trigger point, homeowners also need to “recognize a problem with existing energy use or installations” – and this is especially the case for heating.

Generally, interviewed stakeholders felt that trigger points related to life stages and events had more potential to encourage adoption of energy efficiency and/or low carbon heating measures than those related with emergencies.

“I think all the buying a new home, that’s the point at which, the house I own, when we bought it, the boiler was unsafe. But this was 17 years ago but that would have been the point at which as a new owner and you were starting fresh, you’re doing all plumbing or new plumbing, new electrics, that would have been another sort of trigger point (Creative – 15).

“I suppose the big trigger point that has been covered most in that moment of change literature is around moving house and purchasing houses. And that feels like the most viable option. If we’re talking about improving energy efficiency and

retrofitting ... it is quite a significant opportunity there. But you need quite a lot of enabling factors around it.” (Policy – 7)

“So selling house, new tenancies, et cetera...there’s a lot of these [trigger points] that go almost unnoticed from a policy perspective, environmental the cost of energy. There’s a lot of installers this year that have taken advantage of people being more concerned [about energy costs].” (Policy – 2).

Trigger points associated with future needs often worked in combination. For instance, life stage changes (e.g., having a child, retiring), were often coupled with moving home or home renovations. Consequently, tailoring communications and support to specific circumstances may help to maximise the opportunity to change behaviour.

The opportunity arising from people working from home was also explored in the REA. A study of households by Hipwood (2020) noted that working from home acts as a trigger for some households to install energy efficiency measures such as wall insulation due to the increased time at home highlighting the acoustic and thermal deficiencies in the house⁷.

Future decisions: owner occupiers

For owner occupiers, discussions around trigger points which related more to planned behaviour were primarily driven by cost and improvements to the quality of the home (i.e., through comfort and aesthetics). There was also a general lack of awareness amongst participants in owner occupier discussion groups on low carbon heating measures such as heat pumps, with many not having heard of them.

Moving house

In the owner occupier discussion groups, participants were provided with the scenario that they were moving into a new house, where they found the boiler to be old and the house to be cold and draughty. Most participants indicated that improving the comfort and warmth of the house for the long term would be their priority, and more important than cosmetic changes. Making changes to the home that make it more environmentally friendly was less of a priority.

“Definitely comfortable and warm. Got to be comfortable and warm. As much as decorating is fun to spend your money on, I would be fearful that something would go wrong with a 15 year old boiler.” (Owner occupier discussion group - 4).

Generally, owner occupiers said they would prioritise low-cost insulation measures first to improve how their homes retain heat, before investing in new ways to generate heat.

“I’d go triple down on the installations and do all of them. And then depending on the amount of money that I’ve got leftover, I’d definitely consider like solar panels

⁷ Hipwood, Tara (2020) Adapting owner-occupied dwellings in the UK: lessons for the future. Architecture and Built Environment. 3:1 pp. 297-315.

and the heat pump technology because they both serve different needs, but both solar panels can do the electric as well.” (Owner occupier discussion group - 4).

There were mixed reactions to a scenario where they were presented with information on heat pumps at a stage where a survey was being undertaken on their house. Some participants indicated that receiving information at this stage may encourage them to consider installing heat pumps, other participants thought that the financial burden of buying a house would discourage further spending, or that people already had enough to think about at such moments:

“I think marketing this is going to be quite a hard thing to do because if you're trying to target people buying a house, they're already pulling out an extraordinary amount of money in the first place. So, if in that search and that survey comes back saying everything's fine, yes, it's a little bit old, here's some of the [new] technology you could consider. Why would you consider that if the survey basically said it's fine for now” (Owner occupier discussion group - 3).

“I think that there's probably so much to consider when you're buying a place. I don't know how these [heat pumps] would be important. It's just there's a myriad of different things that you go through.” (Owner occupier discussion group - 3).

Stakeholders raised the point that moving home can be in both positive and negative situations, for example moving house can be due to buying a first home or following a divorce (Policy organisation – 6). This suggests that approaching individuals at the optimal time and in the right frame of mind is critical to effectively translating consideration to action. This will require a personalised approach, which is best suited to a person or organisation whom the new homeowner has had previous contact with, for example an estate agent.

A scenario was presented to participants where any home that is sold in England would need to meet a minimum Energy Performance Certificate (EPC) rating⁸. From the perspective of selling their home, this generally had a negative reception from owner occupiers, with concerns expressed around costs of installing energy efficiency measures to meet these standards, and difficulties reselling the property. One participant mentioned the potential benefit from the perspective of buying a home:

“From a buying perspective, obviously, you think, oh, yeah, great, because you'd like to think, I don't understand how it all works, but you'd like to think, oh, I'm going to get something much more energy efficiently. But from a selling perspective, I would be thinking, oh God, what's that going to cost me?” (Owner occupier discussion group - 4).

⁸ This scenario was hypothetical. The government has no current plans to require minimum EPC ratings at the point of sale.

A change to EPC requirements was not seen as a trigger to consider installing heat pumps.

Renovation

Owner occupiers in discussion groups generally considered undertaking renovations to be a strong trigger point to installing energy efficiency and/or low carbon heating measures. This was mainly motivated by the fact that both renovations and installing new measures in the home are very disruptive and therefore there are benefits to doing both at the same time.

"I'd definitely go for it. I mentioned earlier, if you're knocking down a wall or changing something or do some project in your home, that's the time to think about kind of ripping out slightly more once you've already started with it" (Owner occupier discussion group - 4).

"If you're like doing refurbishment, ripping stuff out, it seems logical that you consider building in some of this stuff if you're already hacking apart one of these areas of your home. We've got laminate flooring, which is quite easy to damage, so we dropped jars on it in the kitchen. There's all these dents in it now, and that's only after a year, so I can see in five years, fine. We might be thinking to rip all the flooring up anyway, so that was not a good point in time to do it." (Owner occupier discussion group - 4)

Owner occupiers and other stakeholders considered that the installation of heat pumps may be more suited for large-scale renovations than being installed in isolation.

"I feel like it's that kind of thing where if you are doing new builds or you are doing like a whole massive renovation to something like you're doing something really big and you think, I'm going to really make this all efficient. You're looking at everything like that and you go, oh, I'm going to put one of these really great heat pumps in... So to me, it's like that kind of thing that goes with or if you're doing a bigger project or a newer build and that kind of thing." (Owner occupier discussion group - 4).

Retirement and inheritance

One participant in the owner occupier discussion group mentioned the idea of a lump sum from retirement being an important motivator for installing heat pumps due to overcoming financial barriers.

"Whether it's you've inherited some money or whether you've just retired and you have a lump sum from your pension, you've got that money to spend. There are a couple of options that we've not explored. It's the financial side, I think, is going to drive most people to make those major changes and spend an awful lot of money." (Owner occupier discussion group - 3).

There was further discussion about the idea of inheritance leading to more people considering whether to install measures. Several owner occupiers indicated that they would consider using the money to make energy efficient improvements to their home.

Working from home

Despite the suggestion in one paper that working from home could act as a trigger to consider simple home improvements, including energy efficiency measures⁹, the interviews and discussion groups with owner occupiers, revealed a general consensus that working from home was not a particularly strong trigger point. However, one owner occupier in the discussion group indicated that, if they knew they would continue to work from home in the long term, they would consider looking at installing insulation to retain heat better in their home.

“If you know that's your long term what you're going to be doing, then I would be looking at probably, again, installations to start with.” (Owner occupier discussion group - 4)

However, generally the response to working from home has been doing things such as purchasing electric blankets and hot water bottles and heating just one room instead of the whole house – as the current cost of living crisis meant people opt for inexpensive solutions.

“Obviously get an electric blanket instead of having to spend a fortune starting the process of doing everything we've just discussed today. Because if it is going to be just a cold snap in the middle of December, you don't necessarily have to rush out and spend tens of thousands of pounds making your home more efficient, when actually there is easier ways to do it.” (Owner occupier discussion group - 3)”

Future decisions: landlords

For landlords, in discussions in the interviews and discussion groups, future decision making around trigger points was primarily driven by cost and regulation. They are running businesses and regularly cited that they'd need to assess the financial cost of the measure versus its perceived benefit. That benefit may be increased asset value (e.g., the value of the property), increased ability to charge higher rents (e.g., as they can market the property as cosy and cheaper to live in), and/or (to a lesser extent) benefits to the environment¹⁰. Landlords recognise the split incentive problem (where the landlord pays for the energy efficiency or low carbon measure, but the tenant gets the benefit in reduced energy bills) as a challenge to

⁹ Hipwood, Tara (2020) Adapting owner-occupied dwellings in the UK: lessons for the future. *Architecture and Built Environment*. 3:1 pp. 297-315.

¹⁰ Given the low base size, and one discussion group having installed already installed energy efficiency or low carbon heating measures in their properties, caution should be exercised when interpreting this finding.

installation, with one landlord even suggesting going “halves” on any measures with the tenants.

“I think the only way to market it to a tenant would be if they were a long-term tenant and they were planning on being there for like, 20 years. I'd say you want to go half on some solar panels because then that increases the worth of the house for me, should I come to sell it in the future, and it reduces their energy costs per month” (Landlord – 10)

Policy changes

Regulation was also key in landlords' future decision making, particularly around minimum requirements of EPC ratings to rent out a property. In the interviews and discussion groups, they frequently mentioned a belief that the standard would change to an EPC rating of C or above. If this were to be mandated, many landlords stated that they would need to work out what measures would get them to an EPC rating of C, understand the cost of those measures and then decide if they would carry them out or simply sell the property.

“I can see in the future the EPC ratings that's coming in where each property has to be. I think it's a C. Mine's an older property, so obviously that's going to have a massive impact if I've got to bring that up to a C. I think at the moment it's an E and I've done quite a few improvements and things. So, yeah, that's going to be something that I'm going to have to consider. And if it's obviously going to be too expensive, then I have to end up selling, probably” (Landlord discussion group – 1)

Additionally, potential changes to regulations to phase out fossil fuel boilers were also briefly discussed as a trigger point in the landlord group. Landlords expressed a belief that all gas and oil boilers will be stopped in the future due to their climate impact, and consequently such regulations were inevitable. In this context, one landlord mentioned they would consider installing a heat pump in their property if such regulations existed.

“I'd settle for the air [source heat] pump. As you mentioned, all gas and oil boilers are going to be stopped in the future. We all know that. So, we've got to think about other sources [of heat] and maybe the air source heat pump is the next new thing. Would help if government were more definitive about this? 100%” (Landlord discussion group – 2)

Tenant moving out

Landlords recognised that tenants moving out is an opportunity to carry out work on the property. While these moments generally focused on cosmetic changes (e.g. painting), some landlords (generally with larger property portfolios, though not exclusively so) did see scope to install energy efficiency or low carbon measures when a tenant moves out. Benefits of an energy efficient home could then be used to advertise the property for the next tenant.

“we're proactive rather than reactive. We'd rather sort of do things before they need to. And just that's how we've always done this. And we have an opportunity

with a tenant moving out or property or before a tenant moves in, we like to utilize that time rather than having to be reactive” (Landlord discussion group – 2)

“anything that's going to make it warmer and cheaper for the next, and it's something you can sell your property on. Like, you can say to the next new tenant, by the way, we've just put double glazing or under floor heating, roof insulation etc. It's going to be a key factor in renting the property out” (Landlord discussion group – 1)

However, for most landlords in the sample, tenancy changeover is seen as time in which the property is not generating income and therefore changeover time should be minimised, not extended to install any additional energy efficiency or low carbon measures. Additionally, tenant moving out is not immediately associated with such measures.

“Yeah, for me, I think once you do the check out, you know exactly what you're doing, subject to when you've got new tenants lining up, I think you've got a window to work with in order to get the work done. So I try and do it that way to minimize any downtime in that sense” (Landlord discussion group – 1)

“But the mere fact of tenants moving out just that on its own doesn't trigger the need [to retrofit a property].” (Landlord interview – 10)

Buying a property

In the discussion groups, when asked directly about the role trigger points can play in landlord's decision making around energy efficiency and low carbon heating measures, some mentioned the point at which they purchase a property as a good point to intervene. At this point, the property is empty and will likely take a few weeks until tenants move in, providing a window of opportunity, especially for retrofit.

“Yeah, I think that the good trigger point for me is when I just bought the property because usually this is the time when I have time to kind of shape it in the way I want it to be. This is the time when the property is empty when I'm looking for tenants. Then once I start with the viewing I can see clearly what tenants want from the property. And then once I had the property for a while, then I'm just interested in keeping it occupied. I think the point of buying a property, it's a good time to catch the landlords and get them to invest.” (Landlord discussion group – 1)

However, a first-time landlord mentioned that when they had purchased the property and got it to a minimal standard they were reluctant to further invest in the property until it had started to generate income.

“But we thought, just get somebody in there first, just start getting some money in down the line, we can do this.” (Landlord discussion group – 2)

Other factors to consider alongside Trigger Points

Both owner occupiers and landlords in the interviews and the discussion groups regularly cited other factors that would need to be in place for a trigger point to lead to adoption of an energy efficiency or low carbon heating measure. Whilst not the focus of this research, common themes are discussed below.

Financial support

Financial support was the most important factor that needs to accompany a trigger point to make it effective, especially in the context of heat pumps. It is also important that the financial support is maintained all the way from trigger point to installation. One landlord had applied for solar PV grant, triggered by a change in EPC rating requirements. They had the grant approved but when the time came to do the work, the funding had been revoked. Grants, and to a lesser extent long-term loans, tied to trigger points concerning future decisions, were vital for people to give expensive measures due consideration.

In this context, the rising cost of living had reduced the appetite for landlords or owner occupiers to take on additional debt. Consumers were very cautious about borrowing money, given interest rate volatility. Several landlords in the discussion groups highlighted that there were competing demands for expenditure on their properties, especially structural work which was both urgent and expensive.

Information and advice

In addition to financing, providing information and advice to consumers about the range of low carbon heating and retrofit measures available, how to find reliable tradespeople to carry out the work, and what to do should things go wrong, will all be needed to convert intentions into action.

“I would say one of the primary reasons [for trigger points not being effective] is the lack of awareness of the options and the potential benefits to undertaking energy efficiency retrofit.” (Academic – 9)

Providing this information at specific touchpoints linked to various trigger points, for example conveyancing information when buying a house, was seen as important. Consumers need to know they have options when they hit a specific trigger point.

Installers' capability and capacity

There were significant concerns raised by stakeholders as to whether there were enough tradespeople trained to carry out the work (especially related to low carbon heating) when a trigger point occurs. A lack of capacity in the sector was cited as a problem for the Green Home Grant roll out, which in turn inflated the cost of measures.

“So you’ve got a discount being handed to you on the one hand. But actually, if you’ve only got 5% of the trades people you need to carry out the work, they’re in such great demand, they can pick their own price. So we saw some areas where the work just couldn’t happen. In other areas where even with the grant, it would have been more expensive than carrying it out six months prior.” (Landlord org – 4)

Stable and long-term policy

Creating a stable policy environment linked to a long-term strategy around retrofit and heating were also cited by stakeholders as important to lay the foundations for trigger points to be effective. The ‘*stop-start nature of policies*’ was seen to have discouraged installers to invest in training and equipment to install low carbon heating (Policy – 7), and there is resistance from builders to focus on energy efficiency refurbishment work because delays to the administration of grants around the Green Deal had meant ‘*companies had gone bankrupt*’ (Academic – 9). Additionally, Government was seen to have a major role shaping the market and leading the way through capital expenditure on public sector buildings.

“We’re missing a trick. The government¹¹ is not actually putting its money where its mouth is and saying, we’ve put a heat pump into every single government building in the country. We’ve put solar panels on our roofs. There’s something about government leading the way for the change they want to see that is well understood to be something where if you set the example, others will follow” (Policy – 15)

¹¹ This research was conducted in 2023, during the previous government.

Conclusions

Trigger points represent moments in time where individuals' context or circumstances change, and there is scope to increase the salience of low carbon heating and energy efficiency measures, as well as the range of measures under consideration. Overall stakeholders engaged in the research considered trigger points to have potential. However, converting awareness or receptiveness of measures into behaviour was seen as very challenging.

Trigger points associated with longer term planning can provide space to consider a wider range of measures as compared to situations of immediate need, such as a boiler breakdown. For owner occupiers, longer term planning linked to key life events such as moving home or new property purchases, undertaking renovations, and retirement were identified as promising trigger points. For landlords, buying a new property or tenants moving out was seen as a trigger point for considering changes to the property. Landlords reinforced that they are managing an investment and they weigh up the costs and benefits of any changes to the property. Increased asset value or ability to charge higher rents were seen as key considerations when undertaking any form of works for landlords.

Trigger points characterised by an immediate need – for example a boiler breaking down – tend to reduce consumers' consideration set. Owner occupiers tend to turn to quick, familiar solutions replacing like-for-like. Landlords expressed little appetite for installing heat pumps under immediate need trigger points. The upfront cost was considered a barrier for landlords and even if grants were available, the lead time associated with accessing grant funds was deemed to make heat pumps unattractive.

However, planning for an emergency trigger point can be an opportunity. Annual boiler checks may be good trigger points to educate consumers about new technologies, potential policy changes, or financial schemes as they give people time to consider and work out the costs vs the benefits. While this was most motivating for landlords, owner occupiers were less keen on the idea with all participants stating this would not encourage them to replace their boiler early or consider alternative heating sources in preparation for their boiler breaking. Further research could also be done with owner occupiers to explore the potential effectiveness of such moments – this is discussed in more depth below.

Professional advice from trusted sources such as engineers and installers were raised by several stakeholders as an important trigger point. However, it was noted that this trigger point also can act as a barrier to change, with installers discouraging low carbon heating measures, for example, due to their own views, lack of knowledge or limits in terms of skills and availability.

Trigger points do not operate in isolation. Participants in the interviews and workshops highlighted the importance of other factors that need to be in place for a trigger point to be effective. These include building individual's capability (through information and advice), opportunity (through financial support to mitigate the upfront costs, and access to informed and skilled installers) and motivation (through a stable and long-term policy and strategy around retrofit and heating).

This project was exploratory and only involved a limited amount of primary research. While activating trigger points has promise, future research is needed to maximise their value. Two trigger points, each with different characteristics, stand out as candidate areas to explore:

Moving home/ buying a property: buying a new home or property was one of the most promising triggers points identified through the research. However, these moments are often busy and stressful times for consumers, and there are likely to be many demands on people's time and money. Energy efficiency measures would appear to have an intuitive fit with these trigger points – especially for older houses that will most likely benefit from retrofit. The triggers to install low carbon heating are less clear. Research could be done to understand the customer journey for owner occupiers and landlords in greater depth, to identify the most effective moments for change in this journey. Additionally, interventions could be set up to test how intermediaries involved in the process (for example, estate agents, conveyancing solicitors, mortgage brokers, utility companies) may play a role in raising awareness of energy efficiency and/or low carbon heating measures.

Annual boiler inspections/home care services: identifying the right moment to install low carbon heating is particularly challenging, given the large upfront cost and the long return on investment. The most salient triggers relate directly to the need to replace a boiler rather than at point of boiler failure. More research could be undertaken to explore the potential of boiler inspections in depth, and the extent to which consumers can be encouraged to proactively plan for their future heating needs, together with exploring the features of insurance products that could enable such decisions.

Appendices

Methodology

REA - search protocol

Searches for peer-reviewed and grey literature were conducted in December 2022.

This comprised an electronic search of a large multidisciplinary bibliographic database (Scopus) to identify peer-reviewed literature.

The searches were restricted to English-language and peer-reviewed, published journal articles, with no date restriction. Each database was searched using terms related to three broad categories: trigger points, AND consumer, AND energy efficiency heating measures. The search terms related to each category and Boolean operators for combining search terms are summarised in the table 3 below. These were piloted and refined during the REA.

In addition, hand searches of the reference list of included studies, as well as forward citation searches of included studies, was also conducted.

Table 3: Search terms for the trigger points REA

Trigger points	AND	Consumers	AND	Energy efficient heating measures
Trigger point*or		Landlord* or		Energy efficiency* or
Life event* or		Home Owner or		Energy saving or
Life stage* or		Homeowner or		Retrofit* or
Move* house or		Occupier or		Low carbon energy or
Move* home or		Tenant		Low carbon heat*
Sell* house or				
Sell* home or				
Purchase* home or				
Purchase* house or				

Buy* house or				
Buy* home or				
Renovate* or				
Improve* or				
Refurbish* or				
Repair* or				
Breakdown or				
Replace* or				
Retire* or				
Marriage or				
Childbirth or				

Screening: Search results were imported into reference manager software (EndNote), and de-duplicated. Search results were then screened against the specified exclusion/inclusion criteria by 6 members of the study team. Reasons for exclusion were documented and summarised in a final PRISMA diagram.

REA - eligibility criteria

Broadly speaking, studies were included if they investigated or evaluated how ‘trigger points’ influence consumers to think about, plan for, and/or install more energy efficiency measures and low carbon heating. Specific inclusion/exclusion criteria are listed below:

Population: Residential consumers, defined as homeowners, owner occupiers, landlords and tenants.

Outcomes: In this context, the primary outcome of interest is behavioural, and specifically refers to the retrofitting and/or adoption of more energy efficiency and low carbon measures in the household. Examples of such measures include, installing insulation, advanced glazing, or switching from gas or oil to a low carbon alternatives. Secondary outcomes of interest may be psychological in nature, such as increasing awareness of such heating measures or increasing intention and motivation to adopt such measures in the future.

Intervention: The primary intervention of interest in this context is being conceptualised as a 'trigger point.' Trigger points are defined as naturally occurring external time points and/or salient events that might prompt, encourage, enable or even force, individuals to change their behaviours in some capacity. In this case, trigger points might be events and time points that prompt, encourage, enable or force individuals to adopt more energy efficiency and low carbon heating measures.

If the search retrieved any studies that report the impact of behaviour change interventions, these were also included. This could include individual, organisational or policy level interventions (e.g. educational and persuasive campaigns, framing/reframing of information, financial incentives or penalties/taxes)

Setting: Household/residential settings only. We excluded other types of buildings (e.g. work place, schools, hospitals, commercial premises, etc).

Design: No restrictions were imposed related to study design. Eligible studies included primary research to explore consumer attitudes, perceptions, experiences and behaviours related to trigger points (i.e. qualitative interviews, focus groups, surveys, observations). Studies might also include experimental, modelling and observational designs to evaluate the effectiveness of different trigger points, and/or interventions and policy measures to encourage behaviour change in relation to trigger points. Any available systematic reviews and evidence syntheses were also included.

Date: No restrictions were placed on the date which a study was conducted.

Geographical location: No restrictions were placed on the country where a study was conducted.

REA – papers reviewed

1. Abreu M.I., De Oliveira R.A.F., Lopes J.- Energy-related housing renovations from an everyday life perspective: Learning from Portuguese homeowners
2. Abreu M.I., De oliveira R.A.F., Lopes J.- Local governance and networked based policies for housing energy-related renovations: insights from a Portuguese case.
3. Alberini A., Bigano A.- How effective are energy-efficiency incentive programs? Evidence from Italian homeowners
4. Alberini A., Bigano A., Boeri M.- Looking for free riding: Energy efficiency incentives and Italian homeowners/
5. Ambrose A., McCarthy L.- Taming the 'masculine pioneers'? Changing attitudes towards energy efficiency amongst private landlords and tenants in New Zealand: A case study.
6. Azizi S., Nair G., Olofsson T.- Adoption of energy efficiency measures in renovation of single-family houses: A comparative approach.
7. Azizi S., Nair G., Olofsson T.- Analysing the house-owners' perceptions on benefits and barriers of energy renovation in Swedish single-family houses
8. Bravo G., Pardalis G., Mahapatra K., Mainali B.- Physical vs. aesthetic renovations: Learning from Swedish house owners
9. Broers W.M.H., Vasseur V., Kemp R., Abujidi N., Vroon Z.A.E.P.- Decided or divided? An empirical analysis of the decision-making process of Dutch homeowners for energy renovation measures
10. Cohen J., Azarova V., Kollmann A., Reichl J.- Q-complementarity in household adoption of photovoltaics and electricity-intensive goods: The case of electric vehicles
11. Costa R., Haukaas T., Chang S.E.- Agent-based model for post-earthquake housing recovery
12. Curtis J., Grilli G.- Does moving home affect residential heating decisions? Exploring heating fuel switching in Ireland
13. Denny Gray and Tim Maiden- Evaluation of the reformed Renewable Heat Incentive
14. Denny Gray CAG CONSULTANTS- Evaluation of the reformed Renewable Heat Incentive
15. Druta O., Schilder F., Lennartz C.- Home improvements in later life: competing policy goals and the practices of older Dutch homeowners
16. Duah D.Y.A., Ford K., Syal M.- Expert knowledge elicitation for decision-making in home energy retrofits
17. Ebrahimigharehbaghi S., Qian Q.K., de Vries G., Visscher H.J.- Identification of the behavioural factors in the decision-making processes of the energy efficiency renovation.

18. Ebrahimigharehbaghi S., Qian Q.K., Meijer F.M., Visscher H.J.- Unravelling Dutch homeowners' behaviour towards energy efficiency renovations: What drives and hinders their decision-making?
19. Energy Systems Catapult and the Behavioural Insights Team- Encouraging energy performance improvements at the point of purchase
20. Franke M., Nadler C.- Energy efficiency in the German residential housing market: Its influence on tenants and owners
21. Fuerst F., Haddad M.F.C., Adan H.- Is there an economic case for energy-efficient dwellings in the UK private rental market?
22. Giraudet L.-G.- Energy efficiency as a credence good: A review of informational barriers to energy savings in the building sector
23. Gram-Hanssen K.- Existing buildings - Users, renovations and energy policy
24. Hafner B.R., Elmes D., Read D., White M.P.- Exploring the role of normative, financial and environmental information in promoting uptake of energy efficiency measures
25. Hipwood T.- Adapting owner-occupied dwellings in the UK: lessons for the future
26. Hope A.J., Booth A.- Attitudes and behaviours of private sector landlords towards the energy efficiency of tenanted homes
27. Kerr N., Gouldson A., Barrett J.- Holistic narratives of the renovation experience: Using Q-methodology to improve understanding of domestic energy retrofits in the United States
28. Kranzler E.C., Czajkowski J., Chen L.J.- Identifying Promising Messages to Increase Hurricane Mitigation Among Coastal Homeowners in the United States
29. Lang M., Lane R., Zhao K., Raven R.- Energy efficiency in the private rental sector in Victoria, Australia: When and why do small-scale private landlords retrofit?
30. Lang M., Lane R., Zhao K., Tham S., Woolfe K., Raven R.- Systematic review: Landlords' willingness to retrofit energy efficiency improvements
31. Literature review summary- Energy efficiency improvements to owner-occupied homes: drivers, barriers, and trigger points
32. Mahapatra K., Gustavsson L.- Influencing Swedish homeowners to adopt district heating system
33. Mahapatra K., Nair G., Gustavsson L.- Energy advice service as perceived by Swedish homeowners
34. Michelsen C.C., Madlener R.- Switching from fossil fuel to renewables in residential heating systems: An empirical study of homeowners' decisions in Germany
35. Moore D.R.- The client perspective on factors in the retrofitting of sustainable technologies to traditional rural homes in North East Scotland

36. Mortensen A., Heiselberg P., Knudstrup M.- Economy controls energy retrofits of Danish single-family houses. Comfort, indoor environment and architecture increase the budget
37. Nair G., Gustavsson L., Mahapatra K.- Factors influencing energy efficiency investments in existing Swedish residential buildings.
38. Nair G., Gustavsson L., Mahapatra K.- Owners perception on the adoption of building envelope energy efficiency measures in Swedish detached houses
39. Nair G., Mahapatra K., Gustavsson L.- Implementation of energy-efficient windows in Swedish single-family houses
40. Rinkinen J., Jalas M.- Moving home: houses, new occupants and the formation of heating practices
41. Schleich J., Faure C., Guetlein M.-C., Tu G.- Conveyance, envy, and homeowner choice of appliances
42. Stieß I., Umbach-Daniel A., Fischer C.- Smart small living? Social innovations for saving energy in senior citizens' households by reducing living space
43. Synthesised findings from research and analysis conducted for the evaluation in 2020 (consortium)- Evaluation of the Domestic Private Rented Sector Minimum Energy Efficiency
44. Tjørring L., Gausset Q.- Drivers for retrofit: a sociocultural approach to houses and inhabitants
45. Tunefalk M., Legnér M.- Decision-Making on a National Home Improvement Programme in Sweden and Its Effects on the Built Environment, 1984–1993
46. Turley M., Sayce S.- Energy performance certificates in the context of sustainability and the impact on valuations
47. Wang Y., Qu K., Chen X., Gan G., Riffat S.- An innovative retrofit Motivation-Objective-Criteria (MOC) approach integrating homeowners' engagement to unlocking low-energy retrofit in residential buildings.
48. Weiss J., Dunkelberg E., Vogelpohl T.- Improving policy instruments to better tap into homeowner refurbishment potential: Lessons learned from a case study in Germany
49. Wilson C., Crane L., Chryssochoidis G.- Why do homeowners renovate energy efficiently? Contrasting perspectives and implications for policy
50. Wilson C., Pettifor H., Chryssochoidis G.- Quantitative modelling of why and how homeowners decide to renovate energy efficiently

REA – codeframe for reviewing papers

Key:

BOLD ALL CAPS = Parent label

5. Bold lower case bullet-point = child label

Italics = description of how to use the label

DISRUPTIVE TRIGGER POINT – *Brought about by wider home modifications (e.g. renovating a kitchen and changing the heating system at the same time).*

6. **Pressure from tenants** - *Specifically for landlords, changing norms or expectations among tenants about energy efficiency measures*

7. Home renovations

TRANSITIONAL TRIGGER POINT – *In response to changes in circumstances and lifecycle (e.g. having a child, retirement, increase in income).*

8. **Working from home** - *the transition to WFH leading to demand for home improvements*

9. **Social comparison** - *E.g. a friend/neighbour renovates their home*

10. **Energy price**

11. **Previous experience with energy efficiency measure**

12. **Moving home**

13. **Income increase**

14. **Retirement**

15. **Having a child**

16. **Policy change**

17. **Child leaving home**

18. **News story**

FUNCTIONAL TRIGGER POINT – *Specifically related to heating, i.e. replacing a system that's breaking or to fill a gap in heating needs.*

19. **Professional advice** - *e.g. from heating expert/installer*

20. **Desire for new aesthetics**

21. Desire to reduce thermal discomfort

22. Heating lost

23. Boiler breaks

WAS THE TRIGGER POINT EFFECTIVE – *what was the outcome of the trigger point?*

24. Unintended negative outcome (e.g. adopting an undesirable measure)

25. Increased knowledge/awareness of efficiency measure

26. Increased intention to adopt desired behaviour (e.g. installation)

27. Adoption of desired behaviour (e.g. installation)

28. Consideration set of efficiency measures decreased

29. Consideration set of efficiency measures increased

WHY THE TRIGGER POINT WAS EFFECTIVE (MECHANISM OF ACTION) - *What about the trigger point made it work or not work? E.g. it led to seeking of information that spurred a decision*

30. Motivation - *Reflective and Automatic - did the trigger point change their pros/cons calculation or affect their habits/emotions? Did it add a competing priority?*

31. Opportunity - *Physical and social - did the trigger point change their physical environment or the way in which they perceive others to think/act? Did a friend or family member have a bad experience?*

32. Capability - *Physical and psychological - did the trigger point change what they can do physically or change their knowledge/skills? Did the trigger point prevent them from knowing where to go for efficiency measures?*

STAGE OF JOURNEY – *At what stage of the consumer journey is the trigger point acting?*

33. Action – *At point of purchase*

34. Preparation – *Just before purchase*

35. Contemplation – *During consideration*

36. Pre-contemplation – *Before any consideration*

POPULATION – *Who is the trigger point relating to?*

37. Owner occupier

38. Tenant

39. Landlord

EFFICIENCY MEASURE

40. Solar PV panels

41. Double glazing

42. Boiler

43. Heat pump

44. Insulation

INTERVENTION:

45. Information provision (e.g. comms campaign)

46. Financial incentive

Interviews – sample

Expert stakeholder interview sample (11 participants)

Academics with expertise in consumer behaviour	3
Academics with expertise in energy policy	1
Energy industry organisation	1
Landlord organisations	2
Consumer organisations	2
Organisations with expertise in communications and behaviour change	2

Consumer interview sample (4 participants)

	Owner occupier	Landlord
Installed energy efficiency or low carbon heating measure	1	1
Have not installed energy efficiency or low carbon heating measure	1	1

Discussion groups – sample

Mini group 1: Landlords, had installed at least one energy efficiency or low carbon heating measure.

No. of participants	4
Gender	3 - Male 1 - Female
Age	1 - 18-34 2 - 35-54 1 - 55+
Ethnicity	3 – White 1 – Prefer not to say
Region	1 – South East 2 – London 1 – North West

Mini group 2: Landlords, had not installed energy efficiency or low carbon heating measures (1 landlord who had installed measures was included in this group due to a recruitment error).

No. of participants	4
Gender	3 - Male 1 - Female
Age	1 - 18-34 2 - 35-54 1 - 55+
Ethnicity	2 – White 1 – Black British

Trigger Points for Installing Low Carbon Heating and Energy Efficiency Measures

	1 – Prefer not to say
Region	1 – East of England 1 – London 2 – North West

Mini group 3: Owner occupier, had installed at least one energy efficiency or low carbon heating measure (two owner occupiers who had not installed measures were included in this group due to a recruitment error).

No. of participants	5
Gender	3 - Male 2 - Female
Age	3 - 18-34 2 - 35-54
Ethnicity	5 – White
Region	1 – East of England 1 – North East 2 – North West 1 – Northern Ireland

Mini group 4: Owner occupier, had not installed energy efficiency or low carbon heating measures.

No. of participants	3
Gender	2 - Male 1 - Female
Age	1 - 18-34 2 - 35-54

Trigger Points for Installing Low Carbon Heating and Energy Efficiency Measures

Ethnicity	3 – White
Region	1 – East of England 1 – London 1 – Scotland

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