

# Housing market impacts from heating and energy efficiency regulations in Scotland

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## 1 Executive summary

### 1.1 Aims

The buildings sector in Scotland accounted for approximately 20% (8.6 MtCO<sub>2</sub>e) of the country's greenhouse gas emissions (GHG) in 2020. To help meet Scotland's climate change emission reduction targets measures to decarbonise heating and deployment of energy efficiency measures will be required. The Scottish Government has consulted on proposals for a Heat in Buildings Bill, setting out how Scotland plans to use its regulatory and policy levers to incentivise deployment of clean heating technologies and energy efficiency measures. The proposals would enforce minimum energy efficiency standards for Scottish homes and, after 2045, prohibit the use of polluting heating systems.

This study investigates potential impacts of the Bill on the housing market, through a literature review, interviews with stakeholders and a qualitative assessment. We considered potential impacts on a range of metrics, including property and rental prices, length of time properties spend on the market, the number of properties sold or privately let, geographical or archetypical distributional effects and the impact on the mortgage market. We assessed the following four different scenarios against a policy-free baseline:

- **Heat in Building Bill (S1-A):** assumes the implementation of all proposals consulted on to form a Heat in Buildings Bill, which sets minimum energy efficiency standards for owner-occupiers and private landlords by the end of 2033 and 2028 respectively and prohibits polluting heating systems after 2045. It also assumes inclusion of the proposed early action trigger points including a requirement that properties replace polluting heating systems within a grace period of two years from the point of purchase, and that properties within a Heat Network Zone end their use of polluting heating systems by a certain date and with a minimum notice period.
- **Heat in Building Bill with a five-year grace period (S1-B):** assumes the same regulatory measures as in S1-A, but includes a longer, five-year grace period following both early action trigger points.

- **No-trigger points (S2):** assumes the same regulatory measures as in S1-A, but with the removal of early action trigger points.
- **First-time buyers' exemption (S3):** assumes the same backstop dates and early action trigger points as in S1-A, but with an exemption for first-time buyers from compliance with early action trigger points.

## 1.2 Findings

While the Heat in Buildings Bill scenario ensures earlier compliance with the regulation, it may also result in a slowdown in activity of the Scottish housing market.

In the rental market, tenants are likely to bear some of the upfront costs of energy efficiency retrofits in the form of higher rents. Following the introduction of the proposed Bill, landlords may decide to exit the market if they do not want to comply with the regulations.

Extending the grace periods to five years is not expected to affect compliance rates, compared to a two-year grace period. However, it could delay clean heating installation timings, as homeowners often defer action until the deadline.

If there were no early-action trigger points, compliance with the regulatory framework may be postponed, leading to delayed action in achieving emissions savings. This could result in a significant increase in demand for energy-efficient homes specifically around the backstop dates, potentially causing a shortage of energy efficient properties.

The market slowdown where an exemption for first-time buyers is introduced is relatively modest compared to the Heat in Buildings Bill scenario where there are no exemptions.

## 1.3 Policy implications

The potential introduction of heating decarbonisation and energy efficiency regulation could decrease purchasing activity in the Scottish housing market, particularly in the Heat in Building Bill scenario (S1-A). Deferring or setting varied deadlines for vulnerable segments of the market (i.e., first-time buyers, low-income households, small-scale private landlords etc.) could partially mitigate this downturn.

Additionally, extending the grace periods could partially mitigate the adverse market effects induced by the proposed early action trigger points.

Pairing the regulatory framework with targeted financial support programmes could help lessen these impacts, particularly where they are designed to safeguard vulnerable individuals and help ensure they are able to adhere to the regulations.

First-time buyers might still encounter difficulties with the additional costs required to meet minimum energy efficiency standards when purchasing properties that are not energy efficient. Extending the deadlines for first-time buyers to meet energy efficiency standards, even when they are exempt from trigger points, could be explored as an option. Additionally, integrating these exemptions with support from help-to-buy schemes could maximise market activity.

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## 2 Glossary

<b>Backstop date</b>	Backstop dates in the context of Scottish consultation on proposals for a Heat in Buildings Bill are proposed <b>deadlines before which owners of properties</b> are obliged to undertake any work required to meet the Heat in Buildings Standard.
<b>Clean heating system</b>	Clean heating systems do not produce emissions directly when used. The most common types include heat pumps, solar PVs and district heating.
<b>Early action trigger point</b>	Early action trigger points in the context of the Scottish Consultation on proposals for a Heat in Buildings Bill are obligations placed (a) on <b>purchasers of properties</b> to undertake any work required to meet the clean heating element of the proposed Heat in Buildings Standard <b>after the purchase</b> , within a reasonable timeframe, the so-called ' <b>grace period</b> ' and (b) on homeowners to join a heat network or install an alternative clean heating system after a notice period when a heat network is available.
<b>EPC rating</b>	The Energy Performance Certificate (EPC) rating is a standardised, qualitative assessment of a building's energy efficiency. It typically ranges from A (most efficient) to G (less efficient).
<b>Green mortgage</b>	In this report the term refers to loans intended to finance the purchase energy efficient properties and/or the installation of clean heating systems, as well as to finance energy efficiency retrofits and upgrading to a cleaner heating system. These mortgages often come with incentives such as lower interest rates, cashbacks or additional borrowing capacity to fund eco-friendly upgrades. The market for green mortgages has been growing rapidly in the UK, having grown from 4 such products in 2019 to over 60 in 2024, nevertheless there continue to exist cheaper non-green mortgages available in the UK that may be perceived as more attractive options.
<b>Green premium/Brown discount</b>	In this report green premium and brown discount refer to the price difference between comparable energy efficient (equivalent to EPC band A-C) and energy inefficient properties (equivalent to EPC band D-G), and the price difference between comparable clean heating system and polluting heating system properties.
<b>Homeowner</b>	Someone who owns a property. This includes both owner-occupiers and landlords.

<b>Owner-occupier</b>	Someone who has purchased the home that they live in.
<b>Polluting heating system</b>	Polluting heating systems produce emissions directly when used. These include technologies such as oil and gas boilers.

## 3 Introduction

### 3.1 Background

Through the Climate Change Act 2019, Scotland has committed to reach net zero greenhouse gas (GHG) emissions by 2045, across all sectors of the economy.

The buildings sector in Scotland accounts for approximately 20% of the country's total GHG emissions (Scottish Government, 2024a), hence representing a major source of emissions. GHG emissions in the residential sector are caused mostly by polluting heating systems, such as gas and oil boilers, which produce emissions when used to heat buildings or produce hot water. Decarbonising the residential building stock by 2045 is therefore key to reducing Scotland's contribution to climate change and achieving net zero targets.<sup>1</sup> However, the current installation rate of clean heating systems falls short of what is needed for Scotland to reach net zero. Taking no action to accelerate the transition to clean heating technologies is expected to lead to missing the 2045 net zero target.

In this context, effective regulation is expected to accelerate actions towards achieving desired climate and energy efficiency goals, by encouraging property owners to carry out necessary improvements to decarbonise homes. In November 2023, the Scottish Government published a consultation on proposals to make new laws around the energy efficiency of residential buildings and how they are heated (Scottish Government, 2023a). The proposals include homes across Scotland being required to meet a new Heat in Buildings Standard, encompassing both a minimum energy efficiency standard and a prohibition on the use of polluting heating systems. Specifically, the Consultation on proposals for a Heat in Buildings Bill includes the following proposals:

- Use of polluting heating systems to be prohibited after 2045.
- An early action trigger point to ease the transition to 2045, whereby those purchasing a home are required to end use of polluting heating systems within a grace period of 2-5 years following completion of the sale.
- A further trigger point requiring properties within a Heat Network Zone to end use of polluting heating systems (by a certain date, and with a minimum notice period).
- A minimum energy efficiency standard to be met by owner-occupiers by the end of 2033 and by the end of 2028 for private landlords.

### 3.2 Objectives of this study

This study aims to investigate the potential impacts of the Consultation proposals for a Heat in Buildings Bill on the Scottish housing market with a particular focus on the following key indicators:

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<sup>1</sup> The scope of this report is to provide evidence on the impact of heating and energy efficiency regulations on the residential housing market, while excluding considerations of the non-residential sector.

- Sales and rental prices;
- Length of time properties spend on the market;
- Number of properties sold or privately let;
- Geographical or archetypical distributional effects;
- Impacts on the mortgage market, particularly focusing on changes in supply and demand for green mortgages.

Specifically, it explores the implications for the housing market associated with four different scenarios of potential regulatory measures. These include the introduction of heating and energy efficiency regulations at proposed backstop dates and trigger points (S1-A), extension of the grace period for trigger points (S1-B), removal of point of purchase trigger points from regulatory proposals (S2), and potential exemptions for first-time buyers from trigger points (S3).

Data limitations hinder quantitative assessment, so the study included a systematic desk-based review to capture a wide body of evidence, followed by stakeholder engagement and an extensive qualitative assessment. These were used to infer potential housing market implications associated with the introduction of heat and energy efficiency regulatory measures. We consulted with a wide range of housing market actors, including Scottish Property Federation, Property Mark, Scottish Association of Landlords, Chartered Institute of Housing, ESPC, Zoopla, Rightmove, Rettie, RICS, UK Finance, Lloyds Banking Group, Nationwide, and Savills (see Section 8.1).

## 4 A review of linkages between heating and energy efficiency regulations and the housing market

This section presents the evidence on the linkages between heating and energy efficiency regulations and the housing market. We carried out a literature review, examining both academic and grey literature sources to inform our work<sup>2</sup>. The key findings of this research are presented below. However, a more detailed summary of the literature review can be found in Section 8.3.

The literature review focused on the impact of domestic energy efficiency on house sale and rental prices and other elements of housing market dynamics, more specifically on whether and to what extent heating and energy efficiency regulations affect the housing market. We considered several different housing market impacts, including price premiums or discounts, and the time it takes to sell or let a property depending on its energy efficiency and the type of heating system (i.e., clean or polluting). The variation in these indicators was considered based on geography and property archetypes. Additionally, we carried out research on the

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<sup>2</sup> Grey literature refers to non-academic publications and documents, usually published by various types of organisations, such as agencies, government bodies or experts. Examples include reports, studies, technical papers or conference proceedings (e.g. slides).

potential impact of different grace period lengths on the housing market and on homeowners' behaviours.

Only a very limited number of studies were found to assess the impact of the installation of clean heating systems on property prices. Also, the number of homes sold and the number of properties available for short-term let were found to be largely understudied in the reviewed literature. While we found no evidence of the impact of energy efficiency and the installation of heating systems on the Scottish housing market specifically, there is a body of relevant academic and grey literature that contains important findings:

- **Energy efficiency matters when purchasing or renting a home.** Properties are sold or let at a higher price if they are more energy efficient. However, the green premium and brown discount (see Glossary) are less pronounced in the rental market than in the sales market. Also, it is **difficult to decouple the green premium and brown discount from other property characteristics** (i.e., style, quality, newness, decoration).
- **Limited information is available on the price impact of installing clean heating systems.** While clean heating systems tend to increase property prices, studies have assessed this impact in climatic and market conditions that differ from Scotland. Some factors can significantly influence the existence and magnitude of green premiums and brown discounts. These include the region, climate conditions, urban-rural differences, local property prices and dwelling archetypes.
- **Longer grace periods** associated with clean heating system installation trigger points **reduce the perceived costs** of installation.
- There is a convincing business case for green mortgages and green retrofit mortgages, yet market availability in Scotland is currently quite low.

## 5 How different heating and energy efficiency regulation scenarios could affect the Scottish housing market

In order to assess the impact of different policy options for heating and energy efficiency regulations, we developed a policy-free baseline, which assumes that no proposed policies consulted in the Heat in Buildings Bill are introduced. Four regulatory scenarios were considered:

- Heat in Buildings Bill scenario (S1-A), assuming all proposals included in the consultation on a Heat in Buildings Bill are implemented.
- Heat in Buildings Bill scenario with a longer grace period for the proposed early action trigger points (S1-B).
- Heat in Buildings Bill scenario with the removal of the proposed early action trigger points (S2).
- Heat in Buildings Bill scenario with first-time buyer exemption from proposed early action trigger points (S3).

These are illustrated in Figure 1 and assessed in detail in the following sections.

We conducted a qualitative scenario analysis to compare each regulatory scenario against the policy-free scenario. The assessment draws upon important findings from the literature review (discussed in Section 4 and further explored in Section 8.3) with further insights from the stakeholder consultation process (see Section 8.1). The qualitative assessment reveals the relationship between different proposed regulatory measures and their expected impacts (e.g., the direction of the impact and potential consequences), but does not quantify them due to the scope of the research and limitations around data availability. As the scenarios differ only in their policy assumptions and assume the same evolution of other factors, only the impact of the policy is assessed.

We use the terms “(green) premium” and “(brown) discount” to refer to the price difference between comparable energy efficient (equivalent to EPC band A-C) and energy inefficient properties (equivalent to EPC band D-G), and the price difference between comparable clean heating system and polluting heating system properties (see Glossary).

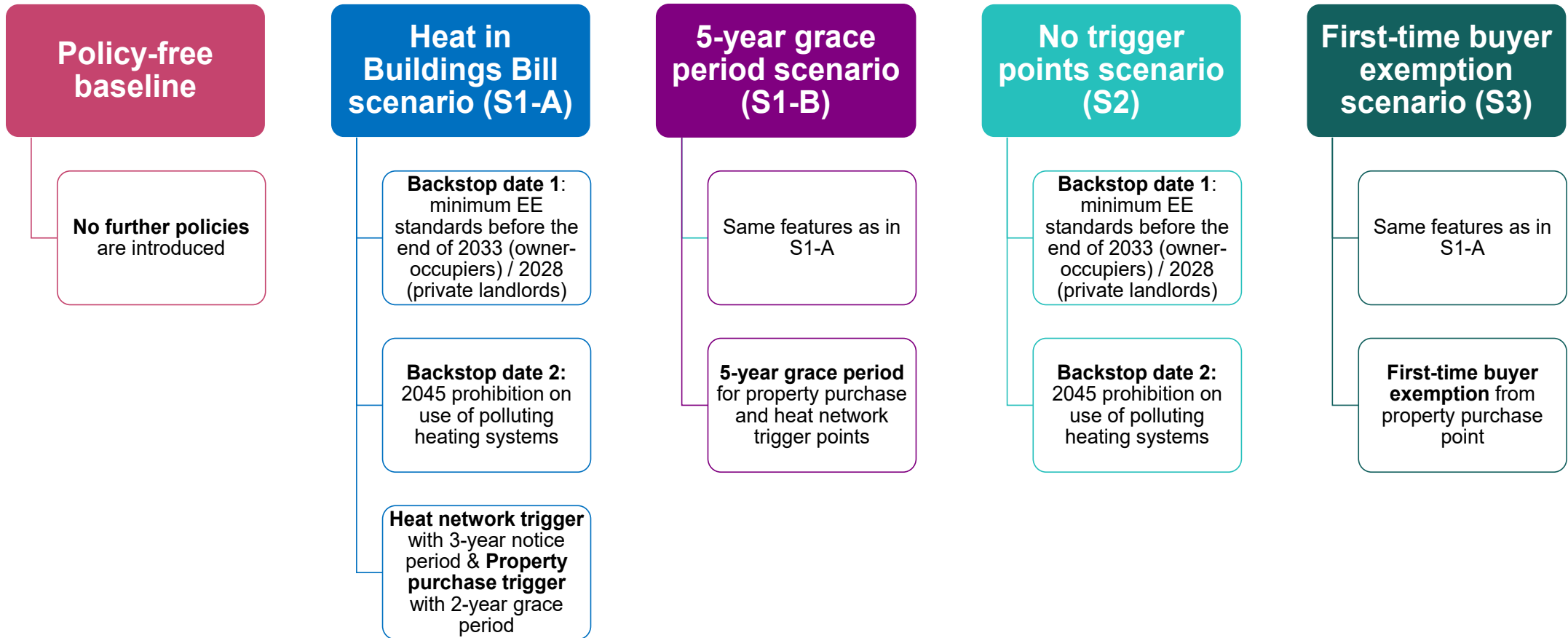


Figure 1: Summary of regulatory scenarios considered in this study

Notes: The Heat in Buildings Bill scenario (S1-A) assumes the implementation of the proposals outlined in the Scottish Government’s consultation on a Heat in Buildings Bill. Trigger points refer to early actions requiring (a) property purchasers to install a clean heating system within a grace period after purchasing a property (property purchase trigger point) and (b) homeowners to join a heat network or install an alternative clean heating system after a notice period when a heat network is available.

## 5.1 Policy-free baseline

The policy-free baseline has been designed to capture the key underlying trends against which the other scenarios are compared.

Our policy-free baseline assumes that no further Scottish or UK-wide policies are introduced up to 2045 to regulate the installation of clean heating or energy efficiency in the residential buildings sector. However, this does not imply that decarbonisation of the residential building stock will stop. Several market drivers and behavioural changes are expected to continue driving energy efficiency and clean heating uptake without policy intervention. These drivers refer to regulations already in force, including changes to Building Regulations which require that all new build properties meet strict energy efficiency requirements from 2023, and the New Build Heat Standard (NBHS) which prohibits the installation of polluting heating systems in new buildings applying for a building warrant from 1 April 2024<sup>3</sup> (Scottish Government, 2024b). Drivers also include increasing climate awareness, greater awareness of the comfort enjoyed in energy efficient buildings and the expected reduction in the installation costs of clean heating systems.

Other key drivers including electricity and gas prices or general macroeconomic conditions (e.g., GDP growth rate, inflation) also affect the decarbonisation rate of domestic buildings. However, it was not within the scope of this project to make assumptions about the future evolution of these drivers.

## 5.2 Heat in Buildings Bill (S1-A)

The Heat in Buildings Bill scenario (hereafter S1-A) includes the proposed policies in the consultation on a Heat in Buildings Bill (hereafter: policies) (Scottish Government, 2023a), and assumes that all proposals as consulted on are introduced. It includes the following measures:

- All domestic buildings achieve a minimum energy efficiency standard, which is broadly equivalent to EPC band C, before the end of 2033 for owner-occupied homes and before the end of 2028 for privately let properties.
- Polluting heating systems are phased out by 2045, with trigger points ahead of this date in the following circumstances:
  - Point of purchase trigger point: all sold dwellings must end the use of any polluting heating systems within 2 years of purchase<sup>4</sup>.

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<sup>3</sup> The New Build Heat Standard (NBHS) is currently being reviewed, as announced by the Scottish Government on 28 May 2024.

<sup>4</sup> The Scottish Government consulted on a grace period of 2-5 years for installation of clean heat systems following the purchase of a property. For the purpose of this study, we have assumed a grace period of 2 years, in all scenarios except for S1-B which assumes 5 years.

- Heat network zones trigger point: properties within a Heat Network Zone end their use of polluting heating systems with a 3-year specified notice period<sup>5</sup>.

This section first describes the expected impact of this scenario on the property market (for owner occupiers), followed by the rental market. Finally, the intra-market effects between the property and rental market are discussed.

### 5.2.1 Owner-occupied homes

The expected impacts of the policies are illustrated in Figure 8 (see Section 0) which separates owner-occupied homes into two categories: **homes which do not meet the requirements of the policies** (referred to as **energy-inefficient properties**, with EPC rating of D to G, without clean heating systems); and **energy-efficient homes with an EPC rating of A-C** (with or without a clean heating system)<sup>6</sup>. While several housing market impacts are described in this section, an in-depth analysis about the price premium of installing energy-efficiency retrofits and clean heating systems is included in Section 5.6.

The proposed property purchase trigger point, which requires clean heating systems to be installed within a set grace period following the purchase of a property (assumed to be 2 years in this scenario), is expected to place an additional financial burden on purchasers. This may substantially influence the decisions of individuals considering moving, as they will face an additional cost when moving to a new property without a clean heating system installed. The proposed property purchase trigger point affects both individuals living in energy-inefficient and energy-efficient homes. However, the proposed regulation is likely to particularly impact owner-occupiers currently living in energy-efficient properties. These owner-occupiers are not required to retrofit their homes under the proposed policies, which may result in them being discouraged from moving elsewhere (however, they are still required to install a clean heating system by 2045). A study by Zalejska-Jonsson (2014) indicates that people living in green properties are less likely to move to a non-green property<sup>7</sup>. As a result, the regulation could result in a reduction of the number of energy-efficient homes put up for sale.

Alternatively, trigger points may shift the demand towards properties where clean heating systems are already installed. Therefore, the prices of properties that have already had a

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<sup>5</sup> The Scottish Government did not specify a grace period for the proposed heat network trigger point in the consultation on a Heat in Buildings Bill, but for the purpose of this study, this scenario assumes a grace period of three years.

<sup>6</sup> Based on the consultation on proposals for a Heat in Buildings Bill, owner-occupied homes are not required to carry out energy efficiency improvements if they have clean heating systems installed (as they have no direct emissions). This can potentially create a loophole where owner-occupiers can avoid making energy efficiency improvements.

<sup>7</sup> The paper defines green properties as energy-efficient properties with low environmental impact.

clean heating system installed are expected to rise, reflecting the costs of installation in the property's value<sup>8,9</sup>.

As a result, future homebuyers are likely to postpone or abandon their plans for moving, leading to a lower number of properties sold in the market. In other words, by raising the overall cost of moving for all potential buyers, early action trigger points may behave akin to a tax on a house purchase, reducing the number of transactions. As the housing market slows down, the time properties take to sell is also expected to increase. The housing market impacts of trigger points can be likened to the UK Stamp Duty Land Tax, which the literature deems to be an excessively distortive tax (Scanlon et al., 2021), causing market slowdown and ensuing housing inefficiencies (people do not move as expected when there is a change in their living circumstances, e.g., when children move away).

From a policy point of view, when people move from an energy-inefficient home to a new property, they face three options:

1. **Moving to an energy-efficient property with clean heating system.** When people move from an energy-inefficient property to an energy-efficient home with a clean heating system, they will not be required to carry out any further retrofitting after moving in. As a result, energy-efficient properties with a clean heating system can become more attractive when people are looking to buy. Retrofitting a home (either due to energy efficiency backstop dates or the property purchase trigger point) involves additional financial and non-financial costs. These include the time and effort spent making arrangements with professionals to carry out the retrofitting and installation works, as well as the general disruption the work causes. In fact, backstop dates in general may incentivise some people to move to an energy-efficient home with a clean heating system instead of retrofitting their own property to avoid these non-monetary burdens<sup>10</sup>. As a result, backstop dates may increase the number of homes sold<sup>11</sup>.

Theoretically, regulation may also lead to a shift in the demand from houses to flats

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<sup>8</sup> Hence, while people living in clean heating system homes are more likely to sell them at a competitive price, they would face more competition when searching for another clean heating system home.

<sup>9</sup> A few homeowners may install a clean heating system before they sell their property in order to increase its value. However, based on the stakeholder interviews, this effect is expected to be marginal.

<sup>10</sup> It is important to note that people are unlikely to move just to avoid carrying out energy efficiency retrofits as the financial (e.g., stamp duty, solicitors fee) and non-financial (e.g., the burden of moving or the emotional cost of leaving a familiar environment) costs can be high. However, those considering a move may advance their plans due to the backstop dates. It is also likely that most owner-occupiers will choose to stay and bear the costs of retrofitting, especially if the financial and non-financial costs of moving outweigh the costs of retrofitting.

<sup>11</sup> This also means that there are two opposing impacts (i.e., a driver increasing and a driver decreasing the market activity), but the slowdown due to the purchase trigger point is expected to be stronger.

as they are typically more energy efficient than other building archetypes<sup>12</sup>. Some stakeholders could also imagine a shift towards different archetypes. However, they emphasised the high uncertainty behind this and the fact that energy efficiency is not a key driver when people buy (or rent) a property. Therefore, the proposed policies are expected to have only a marginal impact on demand for different building archetypes.

As a result of the regulation, more people are expected to search for an energy-efficient property with a clean heating system when considering moving. This may lead to an increased demand for energy-efficient properties, while the supply of energy-inefficient properties may also increase. Ultimately, this may lead to greater brown discounts for energy-inefficient properties or properties without a clean heating system. Over time, however, energy-efficient properties with clean heating systems are expected to represent a higher proportion of the residential building stock due to the policies. This may lead to greater supply of these properties<sup>13</sup>, counterbalancing the increased demand to some extent. For more discussion of the evolution of the price premium due to energy efficiency and clean heating system see Section 5.6.

2. **Moving to an energy efficient property without a clean heating system.** People moving into these types of properties are required to install a clean heating system within a defined grace period. This purchase trigger point will place both financial (i.e., the cost of installing a clean heating system) and non-financial (i.e., finding the optimal solution) costs on purchasers. This can lead to a higher brown discount for properties without a clean heating system. Purchasers comparing similar homes with or without a clean heating system may demand a discount for properties with a polluting heating system. This is because they are required to install a clean heating system within 2 years of the purchase, which is in addition to the purchase price.
3. **Moving to an energy inefficient property without clean heating system.** Moving to an energy-inefficient property without a clean heating system will activate the purchase trigger point and requires the owner to install a clean heating system within the grace period and meet energy efficiency requirements by the backstop date<sup>14</sup>. However, people are likely to factor in the upfront costs of retrofitting as an

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<sup>12</sup> Based on the 2022 edition of the Scottish House Condition Survey (Scottish Government, 2024d), tenements and other flats had an average energy efficiency rating by 3-7 percentage points higher (on a scale of 100) and 67-68% of them were in EPC bands A-C, compared to 40-48% for other archetypes (detached, semi-detached, and terraced houses).

<sup>13</sup> As shown earlier, the proposed regulation could discourage people from moving out of energy-efficient properties with clean heating systems, resulting in a lower number of these types of properties being put up for sale. However, as the share of energy-efficient properties with clean heating systems in the residential building stock is expected to increase (also due to the policies), the supply of these homes is still expected to increase.

<sup>14</sup> If owner-occupiers install a clean heating system (e.g., due to the purchase trigger point), they are not required to meet the minimum energy efficiency standards. Therefore, the purchase trigger point can reduce the installation rate of energy efficiency retrofits. However, it is not expected that a large number of owner-occupiers will choose to install only a clean heating system without energy efficiency retrofits.

additional burden on the top of the purchase price. This is particularly important close to the energy efficiency backstop date. Higher additional costs due to the energy inefficiency of the property could lead to a harder negotiation when purchasing these kinds of properties, since people depreciate the value of the property to some extent. As a result, the brown discount could increase. This is broadly consistent with one of the key findings of the stakeholder interviews highlighting that closer to the backstop dates, fewer people will be willing to move to an energy-inefficient property, resulting in the brown discount increasing over time (see Section 8.1).

When people decide not to move, they will not be affected by the proposed property purchase trigger points and will only have to meet the policy requirements by the backstop dates. Others, who would not move anyway, will also be unaffected by the purchase trigger point but required to meet requirements by backstop dates.

However, properties that are not sold or purchased between the introduction of the regulations and 2045 may be affected by the proposed **heat network zones trigger point** and are still required to comply with the minimum energy efficiency standards by the end of 2033. If the owner of a property is notified (e.g. by the local government) that a heat network is available for connection, they need to stop using a polluting heating system within a specified period of time, such as 2 or 3 years. It is proposed that owner-occupiers would have a choice of either joining the heat network or installing alternative clean heating solutions within the same grace period. While this trigger point is important in accelerating the decarbonisation of the residential building stock, it is challenging to assess its impact. The First National Assessment of Potential Heat Network Zones study (Scottish Government, 2022) assessed the potential geographical areas for heat networks based on different criteria, but no decision has been made on the final area. Some stakeholders also mentioned that there is uncertainty about the extent of heat network zones. They also reported that current and potential future homeowners have a poor understanding and awareness of heat network technology and its potential zones. Therefore, in this study we assume that homeowners do not consider a heat network as an opportunity when looking for a new property or as a potential future cost if they decide not to move from their current home. This assumption significantly diminishes the potential housing market impacts of the heat network zones trigger point, but it may still affect it to some extent.

Due to the uncertainty around the future extension of the heat network zones, the heat network zone trigger point may interact with the housing market in three cases:

- **People may decide to purchase a property without a clean heating system installed in an area where connection to the heat network is not possible at the time of purchase.** In this case, they will be required to install a clean heating system within the grace period, and they are likely to negotiate the price similarly to any other property without a clean heating system. If the heat network becomes available for connection within the grace period, the purchasers can decide to join it (or install a different type of clean heating system), but this is not expected to have an impact on the housing market as it was not known at the time of purchase. It is important to

note that the proposed policies do not require a home located in a future heat network zone to join it if that home already has a clean heating system installed.

- **Alternatively, people may decide to move into a home which is located in an announced heat network zone but has not joined it.** In this case, purchasers are free to install the most appropriate clean heating system option, such as joining the heat network or installing a different type of clean heating system<sup>15</sup>. If connecting to the heat network is cheaper than installing another type of clean heating system, the seller and the purchaser may agree on a higher price compared to a similar home not located in a heat network zone: the purchaser could offer a higher price because of the expected lower financial burden of connecting to a heat network.
- **For owner-occupiers who have not moved since the policy was introduced, the heat network trigger point could accelerate the phase-out of polluting heating systems.** Notified owner-occupiers are required to connect to the heat network or install a clean heating system within a grace period which could be earlier than the backstop date. This requirement could increase the supply of homes with clean heating systems. However, most heat network zones won't be available for connection until after 2035. Most owner-occupiers would therefore be phasing out their polluting heating system (due to the backstop dates) when most heat network connections become available (around 2040). The overall impacts of the heat network trigger point for existing owner-occupied homes are therefore likely to be minimal.

The proposed policies are also expected to **increase the demand for green mortgages**. The increase is expected due to the additional burden of covering the upfront costs of retrofitting (due to the trigger points or backstop dates). When people cannot fully finance the retrofit, they may apply for a loan<sup>16</sup>. If the supply of green mortgages is sufficient and the product is competitively priced, it is expected that the regulation could lead to the growth of the green mortgage market. Stakeholders involved in green mortgages also expect an increase in the total value of green mortgages over time.

One caveat is that, without further measures, the policies included in this scenario can have a **disproportionally high cost on people in lower income groups**. Due to their lower incomes, they are less likely to be able to afford the upfront costs of retrofitting and to get a green mortgage at a competitive price. In addition, the increase in the brown discount could

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<sup>15</sup> A recent CCC study (2021) found that the low carbon heat network technology has the lowest average investment cost per home across the clean heating system options in the UK, both in 2020 and in 2035. Therefore, it is likely that most homeowners will choose this option if available. If the purchasers are aware of this cost difference, the price discount on these polluting heating system properties may be lower compared to properties which are not located in a heat network zone (as the upfront cost of installing a clean heating system is lower).

<sup>16</sup> This may be in addition to the mortgage they would have taken out anyway for a new home, or a green mortgage customised for green retrofitting. Some stakeholders mentioned that they already offer products for green retrofitting.

have a negative impact on them as they may need to sell their homes at a lower price if they want to move.

### 5.2.2 Rental market

The proposed policies in the consultation on a Heat in Buildings Bill (hereafter: policies) also require private landlords to carry out energy efficiency retrofits (equivalent to EPC band C) before the end of 2028 and to install a clean heating system by 2045. The property purchase trigger would also be required to be met by landlords wishing to enter the market or expand their portfolio.

Three main factors can drive the impacts on the private rental market as a result of the policies, which are illustrated in Figure 9 (see Section 0):

- Retrofitting due to the policies.** The policies require landlords to retrofit their properties. A key issue is whether and to what extent landlords and tenants bear the upfront costs (in the form of higher rents). Stakeholders reported that there is a significant housing shortage in the Scottish rental market, particularly in larger cities. Therefore, an increase in rents is expected to have a low impact on the demand for rented properties. In other words, renters would have little or no opportunity to move to another property if they do not want to or cannot afford to pay a higher rent. This implies that tenants are expected to bear the costs of retrofitting, at least to some extent, in the form of **higher rents**.

It is important to note that at the time of writing there were [temporary modifications](#) in place to the way in which applications for a review of a rent increase are determined by Rent Service Scotland, which limit rental increases to some extent where a review is sought. These measures are intended to support the transition away from the rent cap under the Cost of Living (Tenant Protection) (Scotland) Act 2022 which ended on the 31 March 2024. (Scottish Government, 2024c).

Also, due to the shortage of rental properties, landlords may not be concerned about losing their tenants while carrying out refurbishments (i.e., tenants need to bear some non-financial costs, such as the general disruption installation work causes)<sup>17,18</sup> as they expect new tenants to move into the property following completion of the works.

- Exiting the market.** Landlords who do not want to carry out or cannot afford the cost of retrofitting have the option of selling their properties. Stakeholders agreed that this option may be considered by many. According to interviewed representatives in the Scottish rental market, many landlords plan to reduce the size of their portfolios, as a result of market interventions during the pandemic and the energy crisis<sup>19</sup>. The

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<sup>17</sup> However, landlords might face other non-financial costs, such as time spent finding workers to carry out the retrofitting work.

<sup>18</sup> Some types of retrofitting works do not cause major disruption to the lives of tenants, e.g., changing light bulbs, glazing windows.

<sup>19</sup> These interventions included the increase of eviction time (removed from April 2024) and a 3% temporary rent cap which is replaced by a new rent adjudication mechanism from April 2024 (Scottish Government, 2024c).

heat and energy efficiency regulation might lead to a similar effect, particularly if the housing shortage in the sales market is taken into account (i.e., a high price in the property market can be achieved). According to a recent Rightmove report (2023), 33% of all landlords in Great Britain who own a property with an EPC rating below C would choose to sell rather than retrofit. If some landlords do decide to leave the rental market, this could exacerbate the rental housing shortage and lead to **higher rental prices**.

- **New dwellings can enter the market.** Properties which meet the requirements of the policies may enter the rental market. These are likely to be new builds or already retrofitted homes which were owner-occupied or unoccupied prior to entering the rental market<sup>20</sup>. High rental prices can create an incentive (among other considerations<sup>21</sup>) for new landlords to enter the market and for the landlords already holding buy-to-let properties to expand their portfolio. As a result, these properties can reduce the shortage in the rental market (increase the supply) and, therefore, **reduce rental prices**.

### 5.2.3 Interactions between the sales and rental market

The policies proposed in the consultation on a Heat in Buildings Bill (hereafter: policies) are expected to have an impact on the number of homes sold and let. There are two main interacting impacts, partly outlined already in Sections 5.2.1 and in 5.2.2 and depicted in Figure 11 (Section 0):

1. **Landlords may sell their properties due to the implementation of the regulation.** This can have a negative impact on the rental market since it can reduce the supply of properties for letting and, therefore, **rents may increase**. Conversely, these properties can appear on the sales market. They therefore can increase the supply of properties for sale and **may reduce sales prices**.
2. **New buy-to-let properties may enter the rental market.** Properties that meet the policy requirements are more likely to enter the rental market, particularly when local rental prices are high. In this case, they can increase the supply in the rental market and, therefore, **rent prices may be reduced**. Conversely, these properties would not enter the sales market (e.g., new builds would not be sold for owner-occupation but used as buy-to-let properties). This can lead to a reduction in the housing supply and therefore can lead to **higher sales prices**.

**The number of properties on the rental and sales markets** is not affected by decisions made by owner-occupiers and landlords **to retrofit their homes** (while retrofitting is likely to affect the rental prices and/or the value of the property).

<sup>20</sup> For example, based on a Rightmove report (2023), 61% of landlords in Great Britain would not buy a rental property below an EPC rating of C, which is a significant increase from 47% in 2022.

<sup>21</sup> Potential new landlords may have to consider several other factors when deciding whether to enter the rental market. These may include financial (in particular, second home tax) and non-financial considerations (for example, potential issues with new tenants).

In conclusion, the rental and sales markets are strongly linked to each other. Policy-induced actions (e.g., exit or entry to the rental market) can have a converse effect on the other market (e.g., increase or decrease in the number of homes sold). However, determining the relative magnitude of these impacts is challenging and therefore the overall impact on the rental and housing market cannot be concluded at this point.

### 5.3 Heat in Buildings Bill with 5-year grace period (S1-B)

The Heat in Buildings Bill with 5-year grace period (hereafter: S1-B) includes the same policies as the S1-A scenario, but the grace periods for the property purchase and heat network trigger points are set to 5 years (compared to 2 and 3 years, respectively) (see Figure 1). The reason for exploring S1-B is to consider the impact of a longer grace period for both early action trigger points on the housing market. For this reason, the outcomes of S1-B are compared against the outcomes of S1-A, and not against a policy-free baseline.

While key housing market impacts of the S1-B scenario are presented below, a more in-depth analysis about the price impact of installing energy-efficiency retrofits and clean heating systems are included in Section 5.6.

#### 5.3.1 Sales market

We based findings from the literature presented in Section 8.3, which draws heavily on the findings of behavioural economics, and on the stakeholder interviews (see Section 8.1). Implications of a longer grace period for the heat network zone trigger point are discussed later in this section. Three key housing market drivers in the sales market associated with a longer grace period of **the proposed property purchase trigger points** have been identified (see also Figure 10 in Section 0).

- **Lower average cost per year.** In the case of a longer grace period, the average cost per year of installing a clean heating system (the salient cost of compliance) is lower compared to a 2-year grace period (in the case of the purchase trigger point) as owner occupiers are expected to spread out the perceived costs over the longer 5-year period. This may result in a lower perceived financial burden for purchasers. In addition, some homeowners may expect further innovation in clean heating solutions (in particular a reduction in price) in future, which may lead to lower real cost of installation.
- **More time to plan and install the optimal solution.** A longer grace period allows people to better plan their finances. Stakeholders agreed that a two-year grace period may rush people into decisions, and they may not properly consider their options in this period. This could lead them to install a clean heating system which is more expensive or less efficient than another solution.
- **Poorer understanding and/or appreciation of future costs and opportunities.** Based on the findings of behavioural economics, supported by the views of stakeholders, it is realistic to assume that a longer grace period may lead to a poorer understanding of costs. This means, for example, that purchasers are more likely to see the installation of a clean heating system as a future problem. Purchasers would be more

biased about how much the installation would cost and would have less incentive to track these future costs. This contrasts with the previous point, i.e., that people would plan more carefully if the grace period were longer. Instead of rational planning, many people may rush to install a clean heating system at the end of the grace period. Stakeholders mentioned that most purchasers are often unaware of the available clean heating system solutions and their financial and non-financial costs. Also, the type of the heating system in a property is not the primary focus of the purchasers and they may not be aware of or realistically consider the requirements of the policy.

These three drivers all lead to a lower perceived cost of installing a clean heating system in a newly purchased home and to a lower perceived value of an installed clean heating system. As a result, a longer grace period may reduce the green premium for properties with a clean heating system installed compared to a shorter grace period from the proposed property purchase trigger point. In addition, the purchase of a new home can be perceived to be relatively cheaper in the case of a longer grace period, compared to S1-A, due to the lower average cost per year and to the lower perception of future costs. Therefore, more properties are expected to be sold when the grace period is longer. In other words, the 2-year grace period for the property purchase trigger point can be a stronger disincentive to move than a 5-year grace period, as highlighted by stakeholders when interviewed<sup>22</sup>.

It is also important to note that a 5-year grace period can make it more likely that people move into a different property before the end of the grace period. As highlighted by the interviewed stakeholders, this is especially the case for first-time buyers, who are the most likely to move multiple times in a shorter period of time compared to others, due better financial circumstances or a growing family. Those individuals who purchased a property after the introduction of the policy and are required to install a clean heating system within the grace period are more likely to resell their property prior to the installation of a clean heating system at the end of the grace period. This can lead to less intense negotiation when they buy a property without a clean heating system: they may consider moving again in a 5-year period, so they would not fully assess the cost of installing a clean heating system<sup>23</sup>. This can result in a smaller brown discount (i.e., a smaller difference in price between similar homes with and without a clean heating system). However, stakeholders mentioned that owner-occupiers are more likely to use this opportunity than landlords. This is due to the relatively high tax on purchase (which significantly diminishes the return on the property investment in the short term) and the general view that landlords purchase properties as a form of long-term investment.

The S1-B scenario also includes a longer grace period for the **proposed heat network trigger point** (i.e., 5 years compared to 3 years in the S1-A scenario). However, the extension of this

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<sup>22</sup> Stakeholders emphasised that the purchase trigger point is expected to slow down the market in general. However, a shorter grace period can have a higher negative impact.

<sup>23</sup> Moreover, individuals who would typically move after a period slightly longer than the grace period (e.g., in 6 years) may advance their relocation plans (e.g., to 5 years) due to the purchase trigger point, thereby further stimulating the housing market.

grace period is expected to have little impact on the housing market under the assumption made in Section 5.2. As people are not aware of the future geographic extent of the heat network and the potential time when connection will be available, they cannot consider the potential costs and benefits of connection. This uncertainty is independent of the length of the grace period. However, when a home is purchased in an area where the connection to the heat network is possible, but not yet carried out, the purchasers have a longer period to comply with the regulation. Similar to the property purchase trigger point, this longer grace period can lead to a lower average cost per year, more time to plan and a poorer understanding of the benefits of connecting to the heat network<sup>24</sup>. This may result in a lower green premium for these homes compared to the S1-A scenario. As a key finding, the overall impact of the 5-year grace period on the heat network trigger point may lead to a smaller green premium compared to a 3-year grace period.

### 5.3.2 Rental market

The length of the grace period does not directly affect most rental market participants. Landlords who already own a property at the time of the introduction of the policy and those landlords who decide to leave the rental market (for any reason) are not affected by the property purchase trigger point and are therefore not affected by the length of the grace period (see Figure 12 in Section 0). However, a clean heating system needs to be installed by 2045.

The length of the grace period could affect the potential for new entrants to the rental market and therefore can have a direct impact on the supply of homes let. Potential new landlords (or landlords expanding their portfolio) considering buying a property to let, would face similar market drivers to owner-occupiers. These could include, in a case of a longer grace period, more time for financial and non-financial planning<sup>25</sup>; finding the optimal clean heating system without rushing to install one and a poorer understanding and lower perception of actual costs. In addition, some landlords may delay the installation due to the expectation of lower future costs, driven by innovation (price reduction) or, if they manage a portfolio, through learning-by-doing effects (i.e., they can gain experience in installing a clean heating system in one property and apply it later in another property). As a result, a 5-year grace period could reduce the disincentive for landlords to purchase a property compared to a 2-year grace period, resulting in a relatively higher supply of rental properties. However, most stakeholders highlighted that the property purchase trigger point is likely to discourage landlords from entering the market in the first place, irrespective of the length of the grace period.

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<sup>24</sup> If the heat network zone trigger point has a longer, 5-year notice period, purchasers in areas where connection to the heat network is possible but not yet carried out, are more likely to postpone the decision whether they want to connect to the heat network or to install an alternative type of clean heating system as perceiving it as a future problem. Similar to a longer grace period after a purchase of property, this can lead to a delayed planning and to a poorer understanding of costs and benefits of alternatives.

<sup>25</sup> Landlords need to consider that tenants might need to be relocated elsewhere for the period of time when a new heating system is installed, particularly in colder periods.

The aforementioned housing market impacts can also affect rental prices. Stakeholders agreed that most purchasers do not perceive a value in having a clean heating system installed in their rental property, and therefore landlords cannot fully pass on the cost to the tenants through higher rents (although there will of course be value-driven tenants in some cases). In other words, when comparing two similar properties with and without a clean heating system, landlords cannot fully differentiate through rents based on the type of clean heating system installed. However, the type of local housing market is also relevant here: if it is supply-driven (there is a shortage of rental properties), landlords have more power to pass on the upfront costs to the tenants in the form of higher rents. Conversely, in a demand-driven local market, where tenants have more power and choice, less differentiation in rents is possible. Ultimately, this means that in a supply-driven housing market, landlords can pass on the upfront cost of installing a clean heating system to the tenants, which can be higher if the grace period is shorter. Alternatively, a 5-year grace period may reduce the disincentive for new landlords to enter the market, resulting in a relatively higher supply of rental properties, ultimately leading to reduced rental prices.

## 5.4 No-trigger points (S2)

The 'No-trigger points' scenario (hereafter: S2) includes the same policies as the S1-A scenario but excludes both early action trigger points (see Figure 1). While key housing market impacts of the S2 scenario are presented below, a more in-depth analysis about the price impact of installing energy-efficiency retrofits and clean heating systems are included in Section 5.6. Figure 13 in Section 0 illustrates the main changes in the S2 scenario.

As discussed in Section 5.2, early action trigger points can raise the total cost of moving. This could be through the cost of installing a clean heating system where it had not been installed yet, or through the costs being included in the price where the installation had already been carried out. In the S2 scenario, this increase in costs is not present, so the sales market is not expected to slow down, and the time it takes to sell a property on the market is also expected to remain unaffected.

As buying and selling properties does not trigger any further actions from the buyers' side, the main question owners of energy inefficient homes face is how they want to meet the energy efficiency requirements before the end of 2033 and later the clean heating system requirement by 2045. The closer in time a given backstop date is, the more it is expected to matter to buyers. Since the backstop date for clean heating systems is likely perceived to be far into the future, initially only a small fraction of buyers may take this into consideration and with a relatively small weight compared to a policy-free baseline. However, as the backstop dates approach, a growing fraction of market players could account for them, and the ensuing market dynamics impact everyone who participates in the housing market or is considering participation.

Owner-occupiers of energy-inefficient homes without a clean heating system face the choice of carrying out the retrofitting works and/or installing a clean heating system in their own homes, but they also have the option to move to another home in which the required works have already been carried out. This latter option can be attractive as not only have

the financial costs of retrofitting been covered, but owner-occupiers can also avoid the non-financial costs associated with retrofitting (such as the time and effort spent on searching for and arranging professionals to carry out the installation, and the stress and disruption the work can cause). If owner-occupiers choose to move, the demand for energy-efficient homes with clean heating system and the supply for energy-inefficient homes can increase, while the demand for energy-inefficient homes would tend to decrease. This would bring about an increased brown discount. Although the backstop dates only directly concern owner-occupiers of energy inefficient properties, owners of energy-efficient properties moving for other reasons might also be increasingly inclined to look for energy-efficient properties. This could reinforce the increase of the brown discount.

If owner-occupiers choose to stay and carry out energy efficiency retrofitting in their homes as the relevant 2033 backstop date approaches, it is arguable that there are efficiencies to exploit if they also decide to install a clean heating system. Should they not do so, by the end of 2045 they will have to undergo further work to replace their heating system with a clean technology or move to a home with a clean heating system.

## 5.5 First-time buyer exemption (S3)

The final scenario (hereafter: S3) includes the same policies and trigger points as the S1-A scenario, but with an exemption from the property purchase trigger point for first-time buyers. In other words, first-time buyers would not need to replace polluting heating systems within the grace period (assumed to be 2 years in this scenario)<sup>26</sup>. Figure 14 in Section 0 illustrates the main changes in the S3 scenario.

Since the removal of help-to-buy schemes, first-time buyers cease to be financially supported by the government in buying a property. As their relative purchasing power is likely to be lower compared to those that have already owned a home, potential first-time buyers either have to remain in their current living arrangements (on the rental market or with family) or settle for more affordable, likely energy-inefficient properties (without a clean heating system).

Especially in the early years of the policy, a first-time buyer exemption from the proposed property purchase trigger point is similar to the 2017 Stamp Duty Land Tax First-time Buyers' Relief in England and Northern Ireland. This amounted to a reduction of up to £10,000 of overall costs of moving. A report published by the UK Government (2023) suggests that the relief resulted in an 11% and 18% increase in transactions over and above the volume of the transactions of first-time buyers that would have taken place in absence of the policy for the two relevant discrete mortgage value bands studied. Although first-time buyers are subject to the clean heating system backstop date of 2045, the exemption from the proposed property purchase trigger point is likely to enhance their purchasing power in the housing market compared to S1-A and S1-B scenarios. It follows that exempting first-time buyers from the trigger point could make homes with a polluting heating systems more

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<sup>26</sup> First-time buyers are not assumed to be exempted from the Heat Network Zone trigger point for the purpose of this scenario.

attractive to first-time buyers as it postpones the burden of having to upgrade to a clean heating system. Moreover, the brown discount for polluting heating system homes could still be present on the market, as the additional cost of the heating system upgrade would still remain for the majority of buyers. As a consequence, properties with polluting heating systems could be cheaper on the market. However, as first-time buyers are only obliged to install a clean heating system by the backstop date (the end of 2045), they do not bear the cost of installing a clean heating system in the near future. As a result, they would face a lower effective price for properties without a clean heating system. Although the costs of installation are expected to continue to affect first-time buyers in the long run, they could receive some short-term financial relief from their liquidity limitations.

## 5.6 Property price premium associated with energy efficiency and clean heating systems

In this section, the price premium associated with energy efficiency retrofitting and the installation of clean heating systems is analysed in greater detail.

### 5.6.1 Property price premium associated with installing a clean heating system

The expected property price premium associated with installing a clean heating system over time by scenario is visualised in Figure 2 below. Figure 2 is illustrative only, as no quantitative assessment has been carried out to estimate values. The blue line in the chart shows the main trend in the evolution of the price premium. The shaded area represents the degree of uncertainty: the larger the area is in a given year, the greater the expected uncertainty.

Stakeholders interviewed agree that **there is currently no price premium for properties with clean heating systems** in the Scottish housing market (see Section 8.1). This is due to several factors, including the fact that clean heating technologies are not yet widely used in Scotland, which leads to a lack of understanding about and confidence in these technologies. The most valued heating system is gas central heating as it is perceived to be easy to use and households are familiar with it. For these reasons, the price premium in Figure 2 starts at zero in all scenarios.

In the **policy-free baseline**, we expect a slow increase in the price premium for properties with clean heating systems. The main drivers include the expected decrease in installation costs due to forthcoming innovation, increased supply of trained installers and the lower running cost due to the greater efficiency of clean heating systems (subject to the relative price of electricity to gas at any point in time). Additionally, the increasing climate consciousness and the increased confidence in new technologies (due to higher installation rates and awareness) could contribute to a slowly increasing price premium. These are supported by a study carried out in Finland, where heat pumps are already widely understood and used. Vimpari (2023) reported a significant price premium for homes with ground-source heat pumps compared to other heating technologies in Finland<sup>27</sup>. Also,

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<sup>27</sup> Gas heating is not widely used in Finland.

properties with an air-source heat pump tend to have a higher price premium in those US regions where climate consciousness is higher (Shen et al., 2021).

In **S1-A and S1-B**, there are two main drivers of the premium:

1. **Time effect:** As the backstop date of the prohibition on polluting heating systems (2045) approaches, more people are expected to realise that they need to comply with the clean heating regulations. As shown earlier, this could lead to harder negotiations on price for properties without clean heating systems and higher demand for properties where they are already installed. As a result, **the premium for properties with clean heating systems may increase over time.**
2. **Impact of trigger points:** If the proposed property purchase trigger point is introduced, buyers are required to retrofit their heating system within a proposed grace period after a house purchase. However, close to the introduction of this proposed regulation, only a limited number of properties are expected to be equipped with clean heating systems. Those people who want to avoid retrofitting their home after moving will likely need to pay a higher premium for these homes as the supply is constrained. However, in time, the number of homes with clean heating systems will increase (e.g., due to the trigger points and due to the New Build Heat Standard (Scottish Government, 2024b) enforcing the installation of clean heating systems in new builds from 1 April 2024). This could lead to a jump in the green premium at the introduction of the policies, but it is expected to decrease over time.

The effects of time and trigger points are expected to work in the opposite direction over the regulatory period (i.e., from the introduction of the proposed regulations to 2045). This could lead to a 'U' shape over time, as visualised in Figure 2 below. However, it is important to note that there is a high degree of uncertainty in the magnitude of the different impacts. This uncertainty is particularly pronounced in the case of the impact of the trigger points (introduced in the second point above) as the housing shortage on the property market is a key driver. In addition, while buyers do consider the heating technology when purchasing a property, many stakeholders emphasised that other factors, such as characteristics of the neighbourhood, property archetype, size, etc. can be more important to buyers.

In **S2**, only time has an impact on the price premium. Therefore, a constant increase is expected in the price premium. As people become aware of the approaching backstop dates, the installation of clean heating systems cannot be postponed any longer. This is why the shaded area below the main trend in Figure 2 is shrinking: a relatively higher premium is expected for properties with clean heating systems, with less uncertainty. It is also important to note that the installation rate of clean heating systems (see Figure 4 in Section 8.2) is also a key driver of the premium. If only a limited number of properties have clean heating systems installed, and the backstop date for the prohibition on polluting heating systems is close (2045), potential purchasers are likely to pay more for a property with a clean heating system – otherwise, they will have to install it themselves. In **S2**, we expect the installation rate of clean heating systems to be relatively lower than **S1-A** due to the lack of trigger points resulting in the majority of installations taking place around the backstop

date. This may inflate the price of properties with a clean heating system, as their supply is expected to be limited.

Finally, in **S3**, we expect the price premium to be a mix of the S1-A and S2 scenarios. This means that we expect first-time buyers to behave as in the S2 scenario, i.e. to postpone the installation of clean heating systems to some extent. Other buyers would (and are required to) behave similarly as in the S1-A scenario. As first-time buyers represent around 25% of the market (calculated from Scottish Government, 2023c and Bank of Scotland, 2024), the premium is expected to be closer to the premium observed in the S1-A scenario.

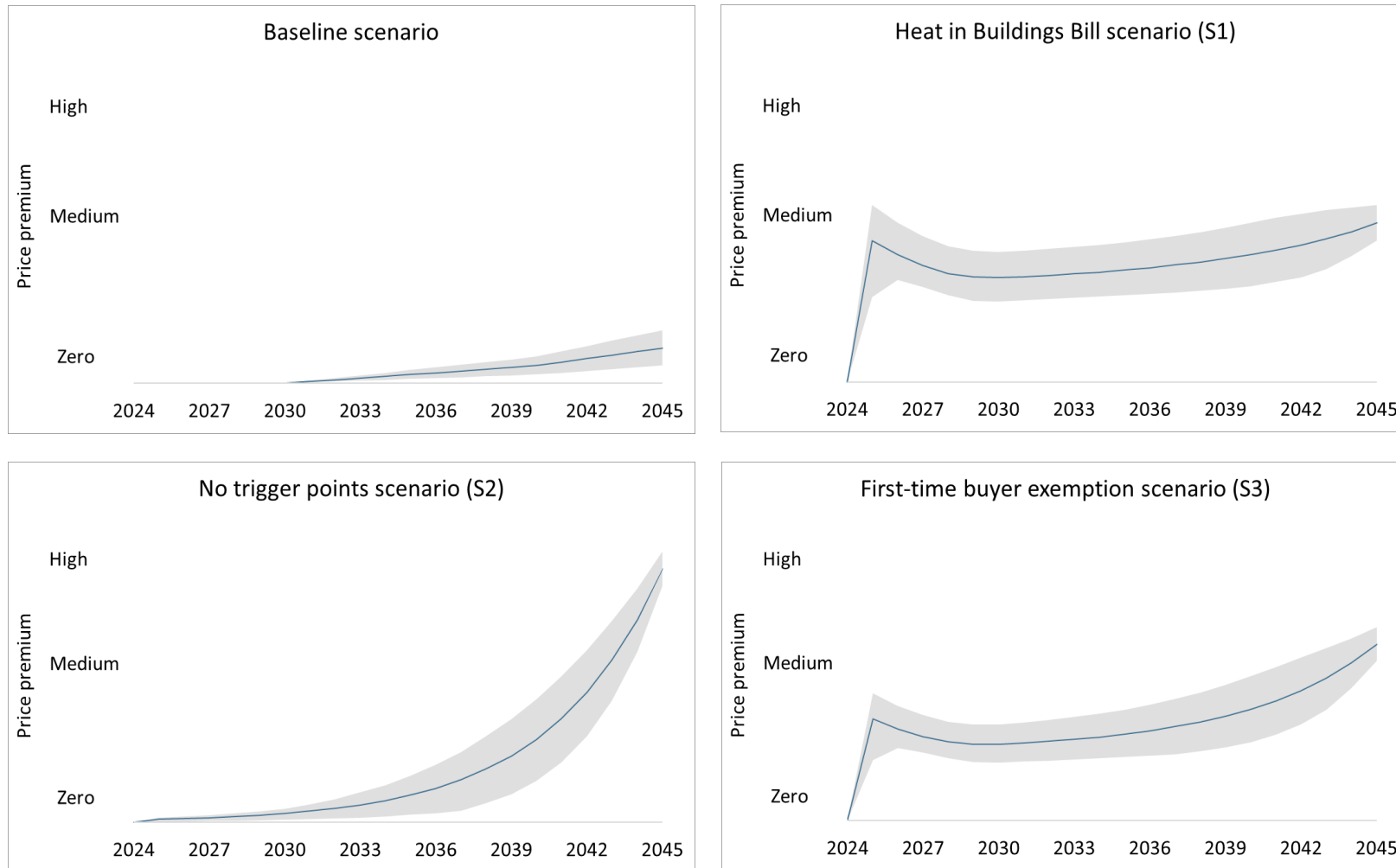


Figure 2: Price premium of properties with a clean heating system over time in all scenarios, compared to properties without a clean heating system.

Note: Price premium on the y-axis refers to the premium compared to the value of the property; blue line and shaded area indicate the mean estimate of the price premium, and the degree of uncertainty around it. The figures are illustrative only, as no quantitative assessment has been carried out to estimate their values.

### 5.6.2 Property price premiums associated with energy efficiency

In the case of the energy efficiency price premium, there are no differences between the S1-A&B, S2 and S3 scenarios (there are no relevant trigger points for energy efficiency, and the backstop dates are universal). As a result, these three scenarios are referred to in this section as the 'Heat in Buildings Bill scenarios' (S1-S3).

In the case of the **policy-free baseline scenario**, we expect a **constant, and relatively low price premium** for more energy-efficient homes. This is supported by the majority of academic sources and some of the stakeholders we consulted. However, many stakeholders were in disagreement that there is currently a green premium in the Scottish housing market (e.g., due to the housing shortage or because levels of energy efficiency are less important to buyers and renters). The lower band of the shaded area of Figure 3 is therefore zero<sup>28</sup>. Stakeholders also reported that energy efficiency (usually measured by EPC rating) is a good proxy for the quality of a property (e.g., having a high quality interior). It is therefore difficult, if not impossible, to disentangle the price impact of energy efficiency from the impact of quality.

In the case of the **S1-S3 scenarios**, the proposed backstop dates to achieve a minimum energy efficiency standard (i.e., before the end of 2028 for rented homes and before the end of 2033 for owner-occupied homes) can drive an increase in the price premium for energy-efficient homes. Investors of buy-to-let properties could have a higher interest in energy-efficient dwellings as they will have to install energy-efficiency retrofits before the end of 2028. Therefore, they would include these costs when investing in an energy-inefficient property.

However, as the majority (62%) of the residential building stock is owner-occupied (Scottish Government, 2023a), a steeper increase is expected close to 2033. Stakeholders mainly agreed that the proposed regulatory policy will create a green premium in future, even if they do not think that a green premium currently exists. However, the size of the potential price premium is uncertain, and stakeholders rather reported a discount for energy inefficient properties. This is explained by the fact that fewer people are expected to be willing to move into an energy-inefficient property as the backstop dates approach.

Additionally, we expect the price premium to decrease after the backstop dates. Some properties in the owner-occupied market are expected to remain energy inefficient (e.g. some people will not be able to afford to retrofit their home and may have been considered as temporarily exempt from the regulations). However, these properties will slowly be taken off the market (e.g., sold or retrofitted after the backstop date) and only a very limited number of them could remain. As the majority of homes are expected to meet the minimum energy efficiency standards, the price premium is expected to fall sharply after 2033. A few

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<sup>28</sup> In the case of some specific properties, such as Georgian and Victorian houses, stakeholders agree that despite their low energy efficiency, there is a price premium for them due to their historic charm and aesthetic value. This could lead to a price premium for inefficient homes in some sub-groups of properties.

years after the policy comes into force, it is expected that there could be no price premium on the market as most homes will comply with the policy requirements<sup>29,30</sup>.

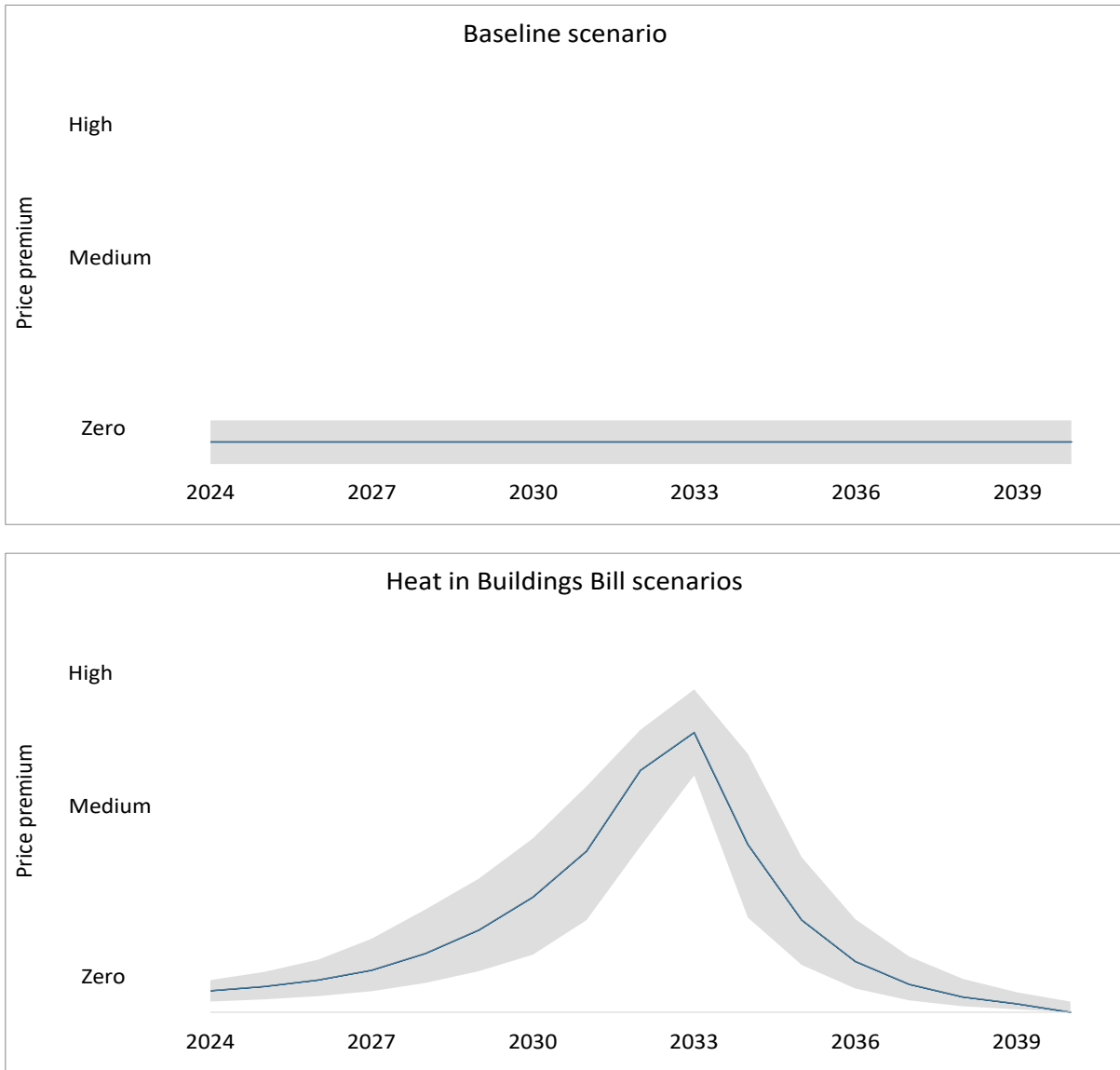


Figure 3: Price premium of energy efficiency over time in different scenarios, compared to properties which does not meet minimum energy efficiency standards.

Note: Price premium on the y-axis refers to the premium compared to the value of the property; blue line and shaded area indicate the mean estimate of the price premium, and the degree of uncertainty around it. The figures are illustrative only, as no quantitative assessment has been carried out to estimate their values.

<sup>29</sup> We do not consider those properties which will be exempt from the policy.

<sup>30</sup> While all properties are required to meet a minimum energy efficiency standard, some variations in the extent of energy efficiency could remain. This may still lead to some price premium for more energy-efficient homes (e.g., an EPC rating of A compared to C).

## 5.7 Key takeaways

We created four scenarios to be compared against a policy-free baseline to analyse the potential housing market impacts of the proposed regulations in the consultation on a Heat in Buildings Bill. The main findings are as follows:

- In the **sales market**, an **increase in the brown discount for energy-inefficient homes without a clean heating system** is expected as the energy efficiency and clean heating backstop dates approach under the Heat in Buildings Bill scenario. The proposed property purchase trigger point may lead to a jump in the green premium after the introduction of the proposed regulation. A longer grace period for trigger points is expected to lead to a smaller difference in the price of similar homes with and without a clean heating system. Without trigger points, a steadily increasing premium is expected, which is ultimately higher than in the Heat in Buildings Bill scenario.
- In the **rental market**, tenants are likely to bear some of the upfront costs of energy efficiency retrofits in the form of **higher rents** (particularly in supply-driven local rental markets). Some landlords may decide to exit the market to avoid complying with the regulations. This would lead to further housing shortages and higher rents. However, high rental prices could also incentivise investors to enter the rental market, mainly purchasing new builds and already retrofitted properties, leading to an increase in the supply of rental properties and subsequently lower rents. A longer grace period for early action trigger points may be less of a disincentive to enter the rental market and increase supply compared to a scenario with shorter grace period. However, according to the interviewed stakeholders, the proposed minimum energy efficiency standard requirement and the proposed property purchase trigger point can be a significant disincentive for landlords to enter the market and an incentive to exit. The overall effect on the rental market depends on the strength of each impact.
- The **time properties take to sell** is increased by the introduction of the proposed property purchase trigger point, as the increase in the overall costs of moving slows the market down.
- We found that several factors may affect **the number of homes sold** as a result of the proposed policies. On the one hand, some factors could disincentivise purchasing a property. For example, the additional costs of installing a clean heating system required by the proposed trigger points mean an additional burden on purchasers. This burden is expected to decrease if the associated grace periods were set longer. On the other hand, other factors would increase the demand for energy-efficient properties and the supply of energy-inefficient properties (e.g., those who would rather prepare for the backstop dates by moving to an energy-efficient property from an energy-inefficient one). Due to these opposing impacts, the joint impact on the total number of sales is unclear.
- The proposed policies are also likely to affect **the number of homes let**. On the one hand, proposed policy interventions (i.e., policy requirements) may cause some

landlords to sell their properties. The proposed property purchase trigger point could be a significant disincentive to landlords entering the market or expanding their portfolio, but a longer grace period may partially mitigate its negative impact. On the other hand, new properties (particularly energy-efficient ones) may enter the rental market if rental prices are a good incentive to enter. Again, the joint impact on the number of homes let is ambiguous.

- When considering **geographical differences**, we found that larger cities are more likely to face housing shortages. This shortage may override the potential positive price impact of energy efficiency as purchasers have limited options to select a home. Therefore, we expect a smaller difference in the price of energy efficient and inefficient homes and/or between homes with and without a clean heating system in urban areas, where the local market is more supply-driven (i.e., the supply of available homes for rent is more limited).
- In considering the impacts of the policy we could not identify clear differences in the housing market impacts by dwelling archetype. While there may be a moderate shift **from houses to flats** (i.e. more people would prefer to choose a flat instead of a house when moving, as flats are in general more energy-efficient), this impact remains uncertain.
- Regulation is expected to stimulate the **green mortgage market** if appropriate products are offered at a competitive price.
- **A first-time buyer exemption** from the proposed property purchase trigger points is expected to give this group of buyers an advantage on the housing market by **lowering potential financial pressures** associated with the purchase of properties without a clean heating system installed.

## 6 Conclusions

- **The presence of strict backstop dates for energy efficiency standards is expected to ensure that actions to comply with the proposed Heat in Buildings Bill regulations are taken early on. This could lead to a green premium in the value of energy-efficient properties** occurring gradually after the introduction of the regulatory frameworks, and then accelerating as the backstop dates approach in both sales and rental markets. However, the green premium attributed to efficient properties can be expected to diminish over time, as the market adjusts to a higher availability of such properties.
- **The introduction of the proposed early action trigger points can be expected to result in an additional financial burden for property purchasers. By raising the overall cost of moving for all potential buyers, trigger points behave akin to a tax on property purchases, reducing the number of transactions in the housing market.** The inclusion of trigger points may ultimately reduce the number of owner-occupiers deciding to move as well as the number of landlords purchasing buy-to-let properties, likely leading to decreased activity in the Scottish residential housing market. Deferring or setting varied deadlines for more vulnerable segments of the

market (i.e., first-time buyers, low-income households, small-scale landlords etc.) would mitigate this. The regulatory framework could be adjusted to extend the grace periods, thereby partially mitigating the adverse market effects induced by the property purchase trigger points.

- **In the rental market, tenants are likely to bear some of the upfront costs of energy efficiency retrofits in the form of higher rents. Following the introduction of the proposed Heat in Buildings Bill, landlords may decide to exit the market if they do not want to comply with the regulations.** This could lead to potential housing shortages and higher rents. It then follows that high rental prices could also incentivise investors to enter the rental market, mainly purchasing new builds and already retrofitted properties, leading to an expected increase in the supply of rental properties and subsequently lower rents, which partially offsets the adverse effect of landlords exiting the market.
- Although homeowners may postpone the installation of clean heating systems until the deadline looms, **extending the grace period for trigger points from two to five years could alleviate their immediate financial strain and partially mitigate a potential slowdown of the housing market.** However, in this context, the market slowdown is relatively modest compared to a scenario with a two-year grace period. A longer grace period can ease the financial burden on homeowners by providing more time for planning and by spreading compliance and cost over a longer period.
- **Not introducing early action trigger points could lead to delayed actions in complying with the proposed regulatory framework, resulting in a more gradual adoption of clean heating technologies.** The absence of trigger points leads to both owner-occupiers and landlords postponing necessary actions until closer to the backstop dates. This causes the demand for properties with a clean heating system to surge significantly around the backstop dates, potentially leading to supply shortages, and a peak in the green premium for properties with a clean heating system during the same period, reaching higher levels than if trigger points were used.
- **The absence of trigger points prevents any distortion in property purchasing decisions. This contributes to keeping the Scottish housing market broadly as active as it would be in a scenario without any regulatory interventions.**
- An exemption for first-time buyer could assist individuals with lower purchasing power within the housing market, and who are more likely to be long-term renters, by lowering barriers to enter the property sales market. In the absence of targeted help-to-buy schemes, **exempting first-time buyers from the property purchase trigger point is still expected to result in a slowdown in transactions in the Scottish residential housing market. However, this effect is less pronounced compared to scenarios where the property purchase trigger point applies to all homeowners, as it eases the financial burden on first-time buyers by granting exemptions from the proposed property purchase trigger point.** Although the first-time buyer exemption aims to support these buyers, they might still encounter difficulties with the additional costs required to meet minimum energy efficiency standards when purchasing properties that are not energy efficient. Combining trigger points

exemptions with extended deadlines for meeting energy efficiency standards could mitigate this.

- **While green mortgages only represent a niche segment of the Scottish mortgage market, the introduction of proposed heating decarbonisation and energy efficiency regulations and the need to comply with them, is expected to lead to a substantial increase in the demand for efficient properties and clean heating solutions, ultimately boosting the green mortgage market in Scotland.** It may also boost demand for other financial products, including unsecured personal loans, where these are available. Targeted products and financial support schemes for first-time buyers and lower-income individuals could help these groups comply with the regulation, reducing the potential disproportionate impacts.
- **In the absence of additional financial assistance programs, the proposed implementation of heating decarbonisation and energy efficiency regulations could disproportionately impact those with lower incomes as well as the ‘late adopters’ of energy efficiency measures and clean heating systems.** Targeted financial support could help lessen these impacts, particularly where they are designed to safeguard vulnerable individuals and help ensure they are able to adhere to the regulations. This can be achieved by offering a range of financial incentives to owner-occupiers, such as grants, subsidies, low-interest loans, favourable financing options, and tax credits. These incentives could be provided both by the UK Government, with the aim of leveraging additional private investment, or by private sector entities, particularly in the case of loans and financing options. Additionally, the Scottish Government could work in close collaboration with the clean heating and energy efficiency industries to identify and implement solutions that could help reduce costs for owner-occupiers.
- **The design of an effective regulatory framework requires consideration of various, and sometimes conflicting, priorities, including timely installation of clean heating systems, ensuring all homeowners can bear the costs of compliance and mitigating adverse effects on the housing market.**

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## 8 Appendices

### 8.1 Appendix A: Stakeholder consultations

Stakeholder interviews were carried out to gain an in-depth understanding of the Scottish housing market dynamics, to obtain views of different stakeholders on the impact of the proposed policies and to validate the findings of the literature review, specifically when the evidence review was not Scotland-specific. The participants of the stakeholder interviews are listed in Table 1. As the S1-B scenario was decided to be added to the study later (to analyse the potential housing market impact of a longer grace period), it involved a second round of stakeholder interviews – the participants of the second round is noted in the last column.

Organisation	Number of interview stakeholders	Sector	Second interview about length of grace period
ESPC	2	Real estate agent	Yes
Houseful	2	Real estate agent	No
Lloyds	2	Banking institution	No
Nationwide	4	Banking institution	Yes
Property Mark	1	Real estate associations	Yes
Rettie	1	Real estate agent	No
RICS	2	Real estate agent	Yes
Rightmove	1	Real estate agent	No
River Clyde	1	Real estate associations	No
Savills	2	Real estate agent	No
Scottish Association of Landlords	1	Real estate associations	Yes
UK Finance	1	Banking institution	No

Table 1: List of interviewed stakeholders

The main topics covered in the stakeholder interviews included:

- The assessment of the impact of energy efficiency and clean heating systems on the sales and rental market. The expected impact of the proposed regulation was also considered;
- Any new, emerging trends due to the pandemic, energy crisis, climate change or any other factors;

- The time it take to sell or let a property depending on its energy efficiency or on type of heating system;
- Geographical differences, such as climatic conditions, local property prices in the neighbourhood, and urban-rural differences;
- Differences between archetypes, potential shift to some types of properties due to the regulation;
- Differences between the Scottish and English housing markets;
- The current state of the green mortgage market, credit risks by EPC rating and the expected growth of the green mortgage market (e.g., key products, increase in the supply of them);
- Discussion of fuel poverty and the expected impact of the proposed policies on it;
- How first-time buyers behave in the housing market and the key challenges they face.

The second round of the interviews focused on the potential housing market impact of a 5-year grace period of the purchase and heat network zone trigger points. This included more detailed questions on the difference between a shorter and longer grace period:

- Perceptions of the financial and non-financial costs of installing a clean heating system (including differences between owner-occupiers and landlords).
- The timing and compliance rate of installing a clean heating system (including differences between owner-occupiers and landlords)
- The impact on financial planning
- The potential impact of moving or reselling a home within the grace period
- Impact on the green premium of properties with clean heating systems
- Impact on rental prices and the number of homes let
- Impact on the mortgage market

While most of the points were discussed with all stakeholders, the depth of their insights depended on their expertise and background. For instance, we had a closer look at the rental markets with the Scottish Association of Landlords, while stakeholders from financial institutions, such as Lloyds or UK Finance were able to provide more detailed information on the state of the green mortgage market in Scotland. Real estate agents could better assess the impact of energy efficiency and clean heating systems on property prices and provide further insights into customer decision making processes.

## 8.2 Appendix B: Installation rate of clean heating systems and rate of energy efficiency retrofit

Figure 4 illustrates the installation rate of clean heating systems by scenario from the current rate to 2045. The main factors driving the trends are summarised below:

- In the case of the **policy-free baseline scenario**, a steady but small increase is expected in the installation rate of clean heating systems, as described in section 5.6.1. The main drivers are the prohibition on polluting heating systems in new builds from 2024 (Scottish Government, 2024b), the expected decrease in the installation costs, the lower running costs due to the high energy efficiency of heat pumps and other clean heating systems (subject to the relative price of electricity to gas at any point in time), the increasing climate consciousness and the increased confidence in new technologies due to higher installation rates and awareness.
- The highest adaptation rate over time occurs in the **Heat in Buildings Bill scenario (S1-A)**. This is due to the proposed property purchase and heat network zone trigger points, which increase the installation rate of clean heating systems.
- In the case of the **no-trigger point scenario (S2)**, only a very moderate increase is expected in the installation rate of clean heating systems prior to a few years of the backstop date (2045). It is only expected to be slightly higher than in the policy-free baseline, as some people will realise earlier that they eventually need to comply with the clean heating regulation. However, there is expected to be a greater increase close to the proposed backstop date, as all homes are expected to face the prohibition on polluting heating systems by 2045.
- In the **first-time buyer exemption scenario (S3)**, the installation rate is the mix of the S1-A and S2 scenarios. First-time buyers are expected to behave as in the S2 scenario. Conversely, other buyers are expected to behave as in the S1-A scenario. As first-time buyers represent a smaller share of the purchasers, the joint impact is closer to the S1-A scenario.
- It is important to note that we assume that all homes that are not exempted from the regulations will be fully adapted to clean heating by 2045. Failure to meet this target is likely to mean that Scotland would not fully meet its net zero target in the buildings sector.

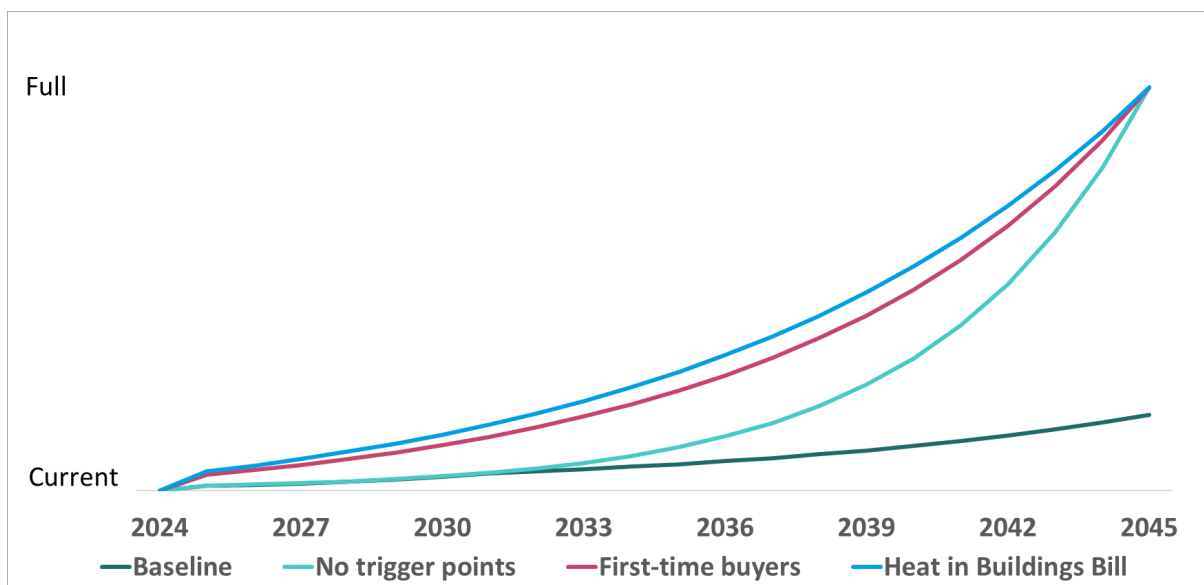


Figure 4: Installation rate of clean heating systems by scenario

Figure 5 illustrates the installation rate of clean heating systems under different grace periods in the Heat in Buildings Bill scenario from the current rate to 2045. If there is a grace period of five years (S1-B) as opposed to two (S1-A), the installation rate could be impacted by the following factors:

- The longer grace period would allow for later installation of clean heating systems or joining a heat network zone, so effectively adaptation is shifted to three years later in time (see Appendix 8.3.3 on procrastination).
- A grace period of five years means more homeowners are expected to move again within the grace period without having installed a clean heating system or joining a heat network zone, further slowing adaptation.
- As described in Section 5.3.1, more properties are expected to be sold under a longer grace period due to the lower perceived costs. Therefore, take-up is expected to be somewhat accelerated by those that do not move again within the grace period.

All in all, the first impact is expected to dominate the emerging installation dynamics, so a significantly slower take-up is expected in scenario S1-B, bringing about a steeper increase in take-up at the years right before the clean heating system installation backstop date at the end of 2045.

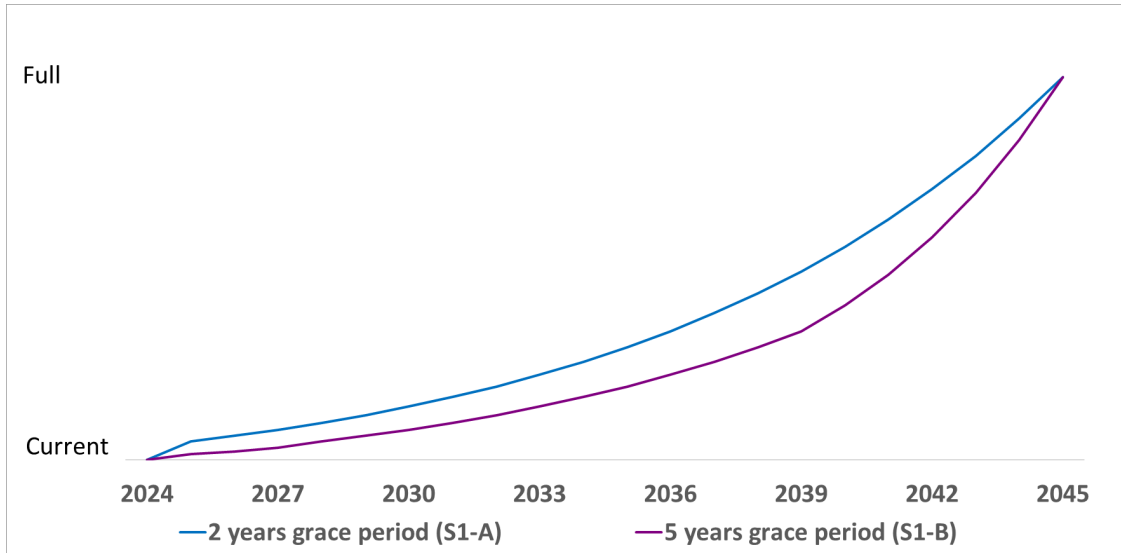


Figure 5: Installation rate of clean heating systems under different grace period lengths, S1-A and S1-B scenarios

Figure 6 illustrates the expected share of properties meeting the minimum energy efficiency standards. The **policy-free baseline** is driven by similar factors as in the case of clean heating systems: higher comfort of homes, lower running costs and increasing climate consciousness. The other scenarios, which do not differ in the case of the energy efficiency regulations, are visualised as the Heat in Buildings Bill scenario. As the private rented sector is required to meet energy efficiency standards by the end of 2028, an increase in the retrofits is expected in the following years. However, the majority (62%) of the residential building stock is owner-occupied and does not need to be retrofitted by the end of 2033. Therefore, we expect a sharper increase in the retrofits between 2028 and 2033 than between today and 2028.

Unlike the case of the clean heating system regulation, we do not expect that all homes which are not exempted from the policy will meet the policy requirements by the backstop date. This is due to the relatively short time to the backstop date (less than 10 years): fewer properties are expected to be sold in that time, and fewer people are likely to afford to retrofit. The consultation on proposals for a Heat in Buildings Bill also mentions that no ban on the sale of energy inefficient homes will be introduced to avoid people being unwillingly left in energy inefficient properties.

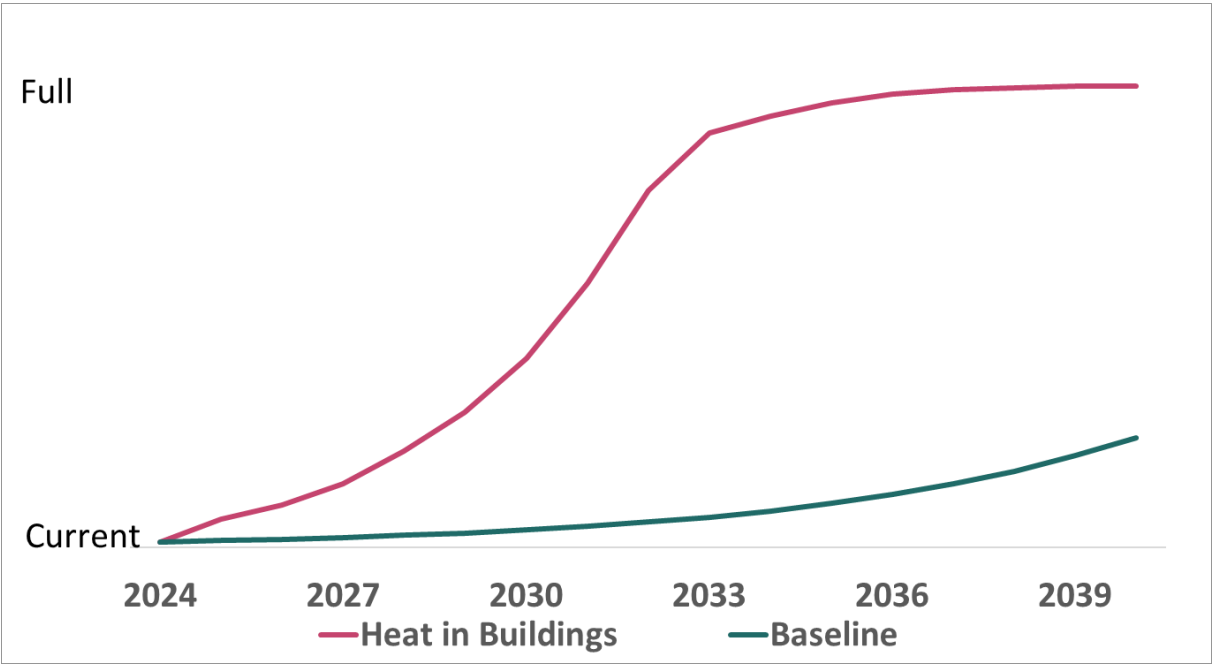


Figure 6: Rate of homes meeting minimum energy efficiency standards by scenario

## 8.3 Appendix C: Additional findings from the literature review

### 8.3.1 Property and rental prices

When analysing the impact of the installation of energy efficiency and clean heating systems in residential buildings on the housing market, we are interested in the existence of a green premium and/or brown discount. The main body of the literature defines a green premium (brown discount) as a term indicating the price premium (discount) of properties with high (low) energy-efficiency compared to their counterparts of EPC band D. The country or region where the impact is assessed is also important. While the focus of this study is solely the Scottish housing market, we found no Scotland-specific analysis available. However, the evidence gathered across the UK and in other countries in the northern hemisphere (e.g., Ireland, Finland, the US) is also relevant and is therefore used to inform our study. Indeed, it is reasonable to assume that energy efficiency has a similar impact on housing markets across various developed markets, particularly if the climate and the cost of energy is similar to those in Scotland.

#### Property sales prices

In the case of property sales prices, most UK-specific academic and grey literature sources report the existence of a green premium and brown discount based on the level of energy efficiency of properties (in England: Fuerst et al., 2015, 2020; in Wales: Fuerst et al., 2016; grey literature using more recent data: Lloyds Banking Group, 2021; Rightmove, 2023). Academic sources in other European countries also agree with the existence of green premiums and brown discounts (e.g., Brounen & Kok, 2011 in the Netherlands, and Jensen et al., 2016 in Denmark).

However, grey literature sources do not always agree with the existence of the green premium and brown discount. For example, most property agents surveyed by Propertymark (2023) reported that they do not think higher energy efficiency leads to a price premium. For example, 66% of them said that the property price does not increase more than the cost of the retrofitting. The controversy between the academic and grey literature sources can partly be explained by the fact that studies cannot fully control for the quality (i.e., overall condition, presentability) of a property<sup>31</sup>. Energy efficiency is usually correlated with the quality of a property: more energy-efficient homes tend to have other desirable characteristics, such as a high-quality interiors and design. This bias is difficult, if not impossible, to disentangle in a quantitative assessment.

A summary of the magnitude of the green premium and brown discount, based on different sources, is shown in Table 2. The different columns show the price difference due to energy efficiency compared to EPC band D by source. For example, a property with an EPC band 'A' or 'B' is sold at a premium of 5-11% compared to a property with an EPC band 'D', assuming

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<sup>31</sup> Also, grey literature sources usually rely on the qualitative assessment of market participants (e.g. agents), while academic sources are based on quantitative methods.

all other factors equal (e.g., age, location). Conversely, less energy-efficient homes (in bands F or G) are priced 1-11% lower than comparable properties with an EPC band 'D'.

EPC band	Fuerst et al. 2015	Fuerst et al. 2020	Fuerst et al. 2016	Lloyds Banking Group 2021	Rightmove 2023
A/B	5.0%	No data	11.3%	8.0%	No data
B/C		6.0%		4.0%	No data
C	1.8%		2.0%	2.0%	3%
D	Base of comparison				
E	-0.7%	No impact	-2.0%	-2.4%	-4%
F/G	-0.9-6.8%	-10-11%	-5.0-7.0%	-5.2-8.8%	-10%
Geography	England	England	Wales	England and Wales	Great Britain
Sample time	1995-2012	1995-2013	1995-2013	2015-2019	Ca. 2008-2022 <sup>32</sup>

Table 2: Price impact of energy efficiency on property prices

Note: Some sources only report results for merged categories (e.g., for F and G combined). Positive values indicate a green premium, while negative values indicate a brown discount compared to EPC band D. If the results are not significant, 'no impact' is reported.

A Swedish report used surveys and found that people who live in energy-efficient homes are willing to pay a higher green premium when buying or renting a new home (Zalejska-Jonsson, 2014). This indicates that people are less likely to move from an energy efficient home to an inefficient one.

Not only do energy efficiency measures impact property prices, but the type of **heating system** used also can affect the value of homes. While no Scottish or UK-specific evidence were found on this, some studies have assessed this impact in other developed countries, albeit, under different conditions. In Finland, where, unlike in Scotland, heat pumps are already widely used and gas heating is not common, ground-source heat pumps and district heating have a positive impact on property prices, particularly in the largest city, Helsinki (Vimpari, 2023). In addition, under different climatic conditions, air-source heat pumps (ASHPs) are associated with positive impacts on US sales prices, particularly in warmer regions (where cooling is more important, as ASHPs can provide cooling as well as heating) and where climate consciousness is higher (Shen et al., 2021).

<sup>32</sup> A more precise sample period is not mentioned in the study.

## Rental prices

In the rental market, price impacts follow a similar pattern to that of sales prices, although their magnitude differs. While both buyers and renters attribute a monetary value to the energy efficiency of homes, buyers place a higher value on it. Therefore, the green premium in rental markets (in a form of higher rents for more energy efficient properties) is smaller (Hyland et al., 2013).

While the premium for energy-efficient rental properties with EPC band A-C can range from 3% to 18%, the discount for energy-inefficient properties is often insignificant in various parts of the UK (Wales: Fuerst et al., 2016; England: Fuerst et al., 2020). In other words, energy efficiency is a factor in determining rental prices for properties in EPC band A-C, but rarely for those in bands E-G. This may be explained by sharper competition for the most energy-efficient properties between owner-occupiers and buy-to-let landlords (Fuerst et al., 2016). In Ireland, Hyland et al. (2013) found a significant brown discount (2-3). Table 3 summarises the key findings of the impact of energy on the rental market by source, similar to Table 2.

EPC band	Fuerst et al. 2020	Fuerst et al. 2016	Hyland et al. 2013
	Impact	Impact	Impact
A/B or B	3-4%	18.5%	2-4%
C	3-5%	4%	No impact
D	Base of comparison		
E	No impact	No impact	-2%
F/G	-4-5%	No impact	-3%
Geography	England	Wales	Ireland
Sample time	1995-2013	1995-2013	Jan/2008 – March/2012

Table 3: The impact of energy efficiency on rental prices

Note: Some sources only report results for merged categories (e.g., for F and G combined). Positive values indicate a green premium, while negative values indicate a brown discount compared to EPC band D. If the results are not significant, 'no impact' is reported.

## Time to sell

The length of time a property spends on the market is a key factor to consider when evaluating its value. Properties that sell quickly are generally considered more liquid assets.

Academic sources usually report a reduction in the length of time properties spend on the rental market, if characterised by higher levels of energy efficiency. In other words, higher energy efficiency reduces the time taken to secure a tenant. For example, in England more energy efficient properties are let up to 35% faster compared to those with F or G ratings

(Fuerst et al., 2020)<sup>33</sup>. In the rental market of the seven largest German cities, less efficient homes were found to spend 17% more time on the market, controlling for rent, living area, property age as well as hedonic, spatial and socioeconomic variables (Cajias et al., 2019, pp. 188-189).

On the sales market, a Santander study (2022) had a similar conclusion, reporting that 75% of agents in the UK think that properties with a higher EPC band rating can be sold two to four months quicker.

Regarding the installation of clean heating systems, no sources have been found which report its impact on the time to sell or let a property given the early stage of policy and the availability of technologies.

### 8.3.2 Geographical and archetypical considerations

Section 4.1. focused on the impact of the installation of energy efficiency and heating systems on property and rental prices in general. However, these price impacts may vary depending on other factors such as location (regional and urban-rural differences) and housing archetypes.

Our desk-based research did not discover any Scotland-specific evidence. Nevertheless, Irish, English and Welsh studies and findings from other developed countries in Europe describe impact mechanisms which can be applied to Scotland.

#### Geographical distribution

There is substantial variability in the impact of energy efficiency on property sales prices in England (Fuerst et al., 2015 and UK Government, 2013). Typically, the green premium is higher in the northern part of the country (see Figure 7). The evidence suggests that this variation can be attributed to the following drivers of regional differences:

- **Variation in climatic conditions:** It can be expected that energy efficiency is valued more highly in regions where the average temperature is colder.
- **Variation in property prices:** In areas where house prices are above average, a fixed amount of annual energy saving accounts for a smaller proportion of total property price. Therefore, the impact of higher energy efficiency is smaller in relative terms.
- **Variation in housing supply:** In the south, where housing supply is more severely constrained, energy efficiency may be pushed down the list of pricing determinants. As there are relatively fewer housing options of given size and location in these areas, the cost savings due to energy efficiency are reflected less in prices.

In Germany, the rental price impact of energy efficiency was found to be less pronounced in more densely populated cities compared to other cities. This is likely driven by more severe housing shortages in big cities (Cajias et al., 2019). Although in a different climatic setting,

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<sup>33</sup> The impact is only significant in the case of B and E rated properties, but insignificant for C and D. The authors explain it with statistical bias (e.g., missing variables, such as the number of listed properties or tenant mobility), and with individual over- and under-pricing.

evidence available from Spain shows that regions with more weather instability have a higher green premium for energy efficiency (La Paz et al., 2019). In the US, the price impact of air source heat pumps, which provide cooling as well as heating, was higher in regions with a warmer climate (Shen et al., 2021).

Urban-rural differences also have an impact on the magnitude of the green premium and brown discount. In Ireland, lower energy efficiency ratings have a significant negative impact on sales prices. This impact is smaller in urban areas than in rural areas. Also, green premiums and brown discounts are smaller in the rental market (Hyland et al., 2013). Urban-rural differences can be explained by stronger demand for houses in urban areas, for example due to increasing demand for living in the agglomeration of larger cities, and the increasing number of new job opportunities in larger cities<sup>34</sup>. Therefore, energy efficiency has a higher impact on sales prices where the supply of properties is higher (in rural markets) and a smaller impact where demand for properties is stronger (in urban areas) (Hyland et al., 2013).

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<sup>34</sup> The study assessed price impacts around the time of the 2008 financial crisis (i.e. between 2008 and 2012).

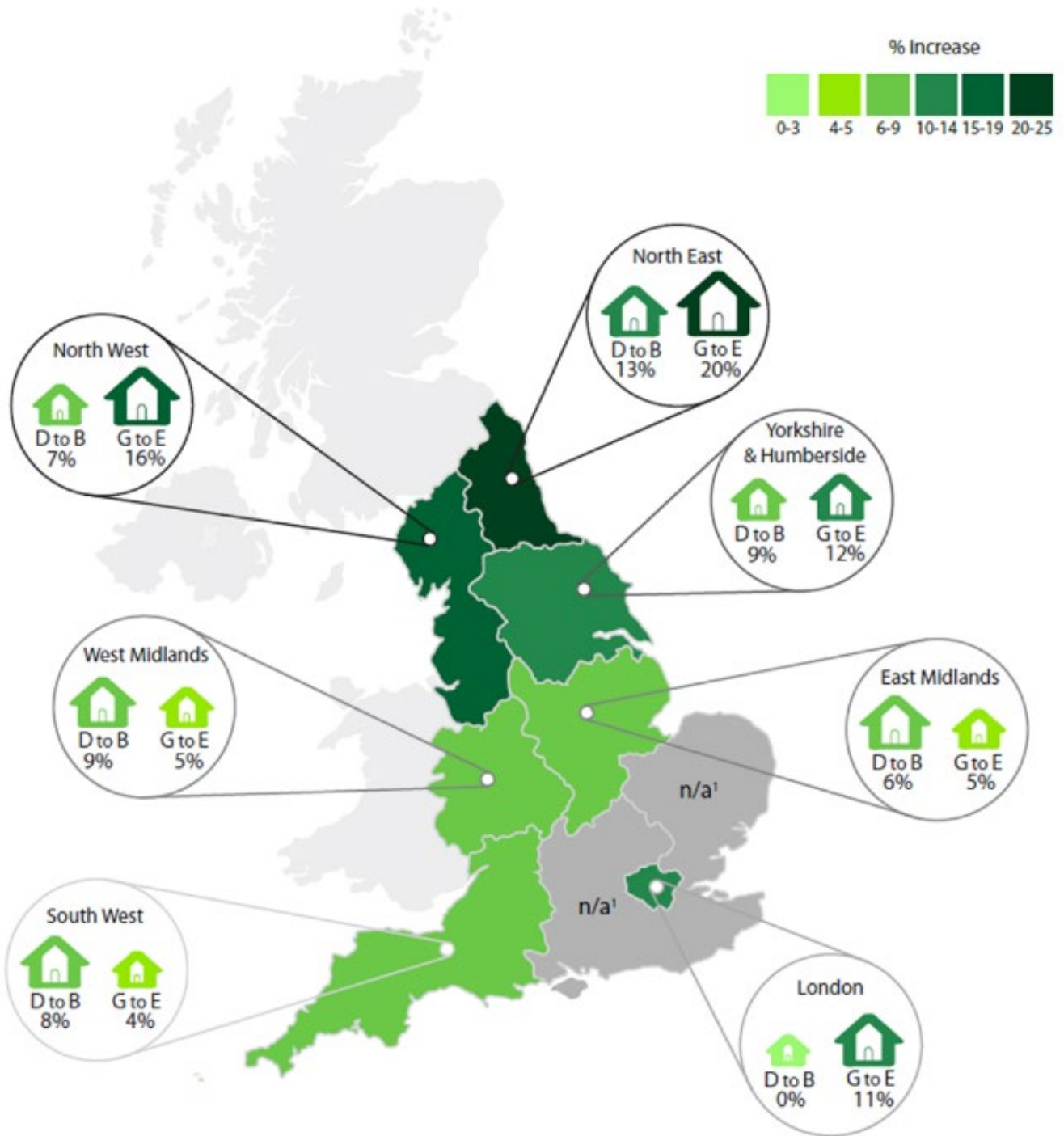


Figure 7: Variations of green premium by UK regions. Source: UK Government, 2013

### Archetypal distribution

It is also important to examine whether there are significant green premiums and brown discounts for different types of dwelling. In Scotland, the usual archetypal categories include detached, semi-detached, terraced houses, tenements and other flats (Scottish Government, 2024d). To our knowledge, no Scottish study has yet been carried out on the

price impact of energy efficiency by different archetypes. Also, due to the early stage of clean heating systems adoption, we encountered a lack of literature on the property price impact of installing clean heating systems by different archetypes. Therefore, this section focuses solely on evidence related to the impact of energy efficiency.

Table 4 presents the key findings on whether the price impact of energy efficiency (i.e., the green premium and brown discount) was found to be significant for different archetypes. In general, studies using property sales data in England (Fuerst et al., 2015) and in Wales (Fuerst et al., 2016) report a significant brown discount for less energy efficient properties (EPC band E-G) for almost all archetypes. However, there is greater variability in green premiums. In England, there is a significant green premium for flats, terraced and semi-detached houses with EPC rating A-C. In Wales, only terraced houses and A or B rated semi-detached houses have a green premium - there is no green premium for detached houses and for flats. The variation in the price premium for different archetypes may be explained by other factors, as for example the local housing shortage<sup>35</sup>. If the supply of properties is severely constrained, purchasers may place less value on energy efficiency.

	Detached-rural	Detached-urban	Semi-detached	Terraced	Flats
<b>England</b>					
<b>Green premium</b>	Negative	No impact	Positive	Positive	Positive
<b>Brown discount</b>	No impact	Negative	Negative	Negative	Negative
<b>Wales</b>					
<b>Green premium</b>	No impact	No impact	Positive or no impact	Positive	No impact
<b>Brown discount</b>	Negative	Negative	Negative	Negative	No impact

Table 4: The impact of energy efficiency on sales prices by different types of dwellings in England and Wales

Notes: In the case of a green premium, 'Positive' and 'Negative' indicate that there is positive or negative price impact of energy efficiency in EPC band A-C, compared to D. In the case of brown discount, 'Negative' indicates that there is a negative price impact of lower energy efficiency in EPC band E-G, compared to D.

When there is 'Negative' or 'Positive' sign and 'no impact' is also added to a cell, it means that results depend on the model specification

Source: England – Fuerst et al., 2015 (Table 4); Wales – Fuerst et al., 2016 (Table 2)

Due to the large variety in the stock of detached houses, they are often divided into two categories, depending on whether they are located in urban or rural areas. In the case of rural detached houses, energy efficiency has a less pronounced or counterintuitive impact (i.e., in England there is a price discount for more energy efficient detached houses). The explanation might be that buyers are willing to pay more for inefficient rural detached houses due to their aesthetic characteristics and emotional values this fosters, without

<sup>35</sup> Local, as housing supply is strongly linked to settlements – a housing shortage in one city does not necessarily mean a shortage in another one.

evaluating their energy performance (Fuerst et al., 2016). For example, a Georgian house is likely to be less energy-efficient than a modern home, but the buyers do not consider it as key barrier due to its historic charm.

In the case of rental markets, there is less evidence on differences across archetypes available. Fuerst et al. (2020) report that energy-efficiency has a higher premium for semi-detached and terraced houses, as well as for flats, compared to detached houses<sup>36</sup>.

In summary, the price impact of energy efficiency varies for different types of dwellings. However, a brown discount for reduced energy efficiency is usually reported for almost all dwelling types, while a green premium is not significant in many cases. Emotional and aesthetic characteristics of properties can override the valuation of energy efficiency standards, especially in the case of detached houses. This impact is stronger in the case of rural detached houses, therefore urban-rural differences are relevant.

### 8.3.3 Grace period length

Our desk-based research covered a substantial range of academic and non-academic literature on policies encouraging the take-up of clean heating systems but have found no inquiry into the marginal effect of differing grace periods. Despite widening our scope to learn from the analysis of other policies which included grace periods, we still did not find any reliable policy-focused study. Therefore, we have directed our attention to theoretical and empirical studies of behavioural economics in the context of timing decisions and cost.

In standard economic thinking (including the so-called neoclassical models of mainstream economics), the timing of cost incurrence is mostly relevant because of liquidity constraints: not having enough available money to meet all consumption needs temporarily. A grace period is an instrument driving the timing of cost incurrence, as it defines the latest point in time when the cost of installing a new heating system after purchasing a new property will be incurred. The so-called 'life cycle hypothesis,' widely accepted in economics, would predict that consumers even out consumption throughout their lifetime. In other words, this means that spending behaviour is not affected specifically when costs are incurred, as people will optimise their borrowing and saving decisions to smooth consumption over time. However, as borrowing and saving is not possible for everyone and can be costly, the timing of costs would indeed become a relevant factor to consider.

Consequently, the prediction of the standard economic thinking is that a longer grace period alleviates some of the burden on liquidity-constrained consumers. In the context of the proposed Heat in Buildings Bill regulations, this would mean that buyers could save more money due to the longer grace period either to purchase a clean heating systems or to save enough for a down payment for a retrofit remortgage.

However, as Carter et al. (2022) show in the context of payday loan repayment, contrary to standard economic theory, consumers do not really benefit from a longer grace period.

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<sup>36</sup> The study compares the price premium of different archetypes to detached houses and reports significantly higher rental price for higher EPC ratings on a scale of 0-100.

Borrowers who are granted an extended grace period exhibit repayment behaviours that are largely comparable to those who are not, with the primary distinction being the extension provided by the longer grace period. One driver they attribute this result to is “naïve present bias” as described by O’Donoghue and Rabin (1999): overweighting present costs and benefits, even slightly, leads to a procrastination of payments. Regardless of the length of the grace period, the necessary reduction in consumption would take place immediately before the end of the grace period. So, although this reduction in consumption could be spread out over a longer period, alleviating the liquidity burden, present biased consumers would not make use of it. In the context of the Heat in Buildings Bill, this means such present biased consumers would not benefit from a longer grace period.

Akerlof (1991) characterized present bias as occurring when “present costs are unduly salient in comparison with future costs, leading individuals to postpone tasks until tomorrow without foreseeing that when tomorrow comes, the required action will be delayed yet again” (p. 1). The lack of attention to the future costs of postponed tasks is very relevant in the context of our study, as for many people longer grace periods would indeed cause inattention to the costs of clean heating system installation. As these costs are to be incurred further in the future, many people will not fully account for the cost of installation of the clean heating system. Therefore, the price premium for properties with clean heating systems will be significantly smaller. Altmann et al. (2019) provide evidence that reminders increase the probability of timely compliance.

Another important behavioural phenomenon that could be relevant is described by uncertainty in the cost of retrofitting, in which case an individual may wait and delay incurring the cost in the hopes of lower costs in future. However, separating this driver (usually dubbed ‘the option value of waiting’) from simple naïve present bias is very challenging (see Heidhues and Strack, 2021).

In summary, standard economic thinking (i.e., neoclassical theory) and behavioural economics both suggest that a longer grace period is less of a disincentive to purchase a property. As the costs of clean heating system installation is less salient and can be spread out over a longer period of time, potential buyers perceive a lower effective price. According to behavioural economics theories, installation can be expected to be carried out close to the end of the grace period due to present bias and the option value of waiting.

#### **8.3.4 Mortgage market**

In the US (Kaza et al., 2014) and Dutch (Billio et al., 2022) mortgage markets, higher energy efficiency of homes leads to lower energy bills, which in turn reduces the risk of default. Therefore, taking energy efficiency into account in the mortgage underwriting process has clear benefits for lenders via reduced financial risk. Moreover, in the Netherlands, three plausible impact mechanisms underlying the relationship between energy efficiency and the probability of mortgage default have been identified (Billio et al., 2022), namely:

- personal borrower characteristics captured by the choice of an energy-efficient properties;

- improvements in building performance that could help to free-up the borrower's discretionary income;
- improvements in dwelling value that lower the loan-to-value ratio.

Energy efficient mortgages or green mortgages that exploit this exact relationship have been on the market for decades (The New York Times, 2006). Recently however, they have become more available in the EU, gathering attention from policymakers (Euractiv, 2021, EEML, 2024)<sup>37</sup>.

A high-level review of the current UK green mortgage market shows that some mortgage lenders offer better deals for borrowers that buy energy-efficient homes in the form of green mortgages. Green mortgages to finance retrofitting, so called 'retrofit mortgages', are also offered at the point of purchase and as a remortgage. Nevertheless, as green mortgages are still scarce, there continue to exist cheaper non-green mortgages available in the UK that can be more attractive options (Green Finance Institute, 2023; Money Saving Expert, 2024).

### 8.3.5 Fuel poverty

The Scottish Government has pledged to lift people out of fuel poverty<sup>38</sup>. The Fuel Poverty Act (2019) set out interim targets for 2030 and 2035, as well as final targets for 2040 to reduce the proportion of households in fuel poverty and extreme fuel poverty<sup>39</sup> to 5% and 1% respectively. In this study it is therefore useful to also touch on the fuel poverty implications of energy efficiency regulation.

According to the 2019 Scottish house condition survey, fuel poverty is most prevalent among households living in energy-inefficient homes and remote rural locations.

- 40% of households living in dwellings rated **EPC band F or G** are fuel poor
- 38% of households living in dwellings rated **EPC band F or G** are extremely fuel poor
- Remote rural areas have the highest rates of fuel poverty and extreme fuel poverty:
  - 43% of remote rural households are fuel poor
  - 33% of remote rural households are extremely fuel poor

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<sup>37</sup> Policies that facilitate green mortgage products include the Energy Efficient Mortgage Label. This was developed by the Energy Efficient Mortgages Initiative to drive the upgrade of the housing energy efficiency profile of lending institution portfolios and to act as a global benchmark for energy efficient mortgages (EEML, 2024).

<sup>38</sup> Defined by the Scottish Fuel Poverty Act 2019: "A household is in fuel poverty if the fuel costs necessary for the home in which members of the household live to meet reasonable fuel needs and requisite temperatures are more than 10% of the household's adjusted net income, and if after deducting such fuel costs, benefits received for a care need or disability (if any) and the household's childcare costs (if any), the household's remaining adjusted net income is insufficient to maintain an acceptable standard of living for members of the household.

<sup>39</sup> Defined as costs of reasonable fuel needs (e.g. adequate heating; detailed definition at paragraph 4 and 3 of the Fuel Poverty Act 2019) exceeding 20% of the household's adjusted net income.

## **8.4 Appendix D: Theory of change – figures**

The following pages includes the key theory of change charts. These are fully explained in the appropriate sections of the main report.

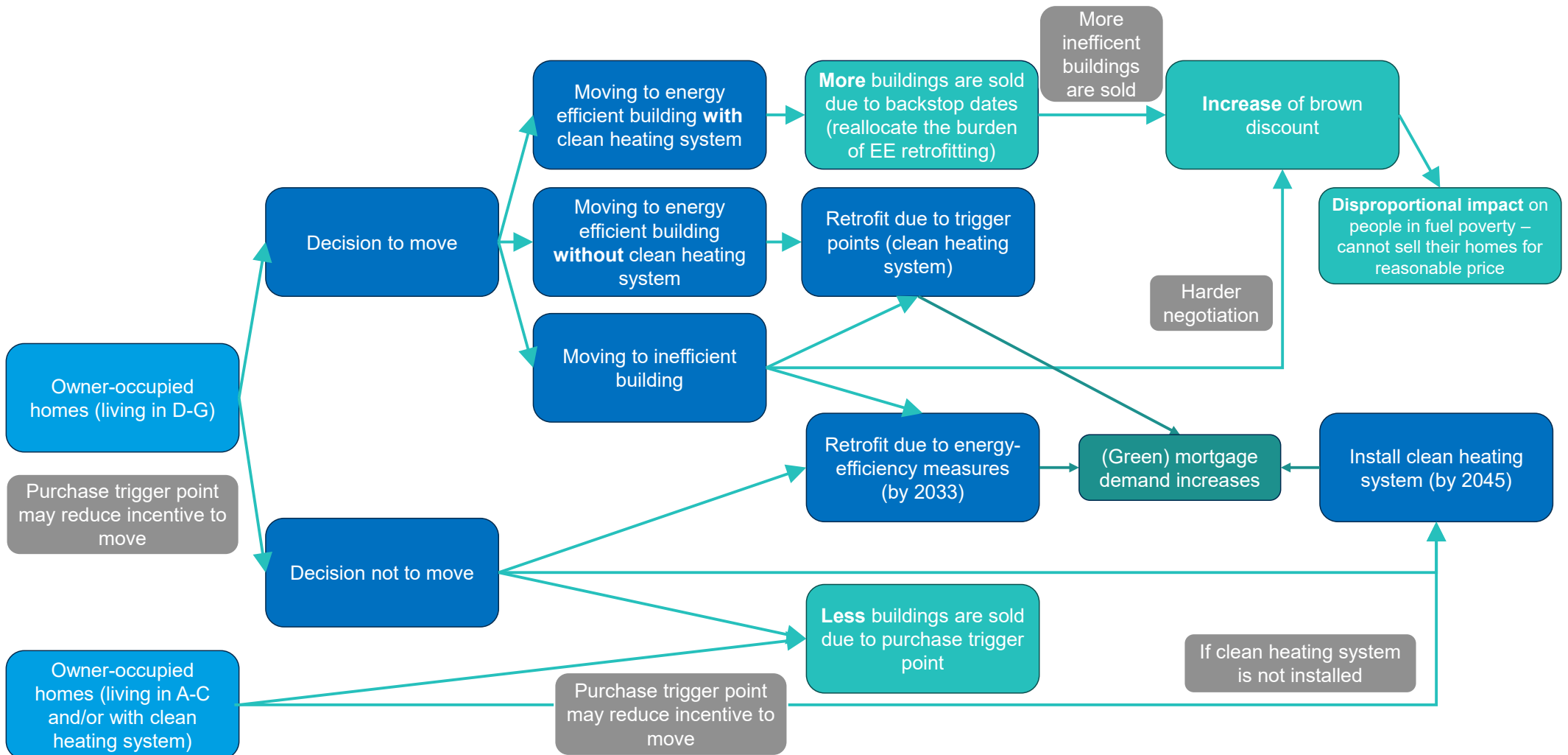


Figure 8: Expected impacts of proposed policies in Heat in Buildings Bill consultation on housing market, S1-A scenario  
 Colour code: light blue – owner-occupier type; dark blue – actions available; turquoise – market impact; grey – mechanism driver

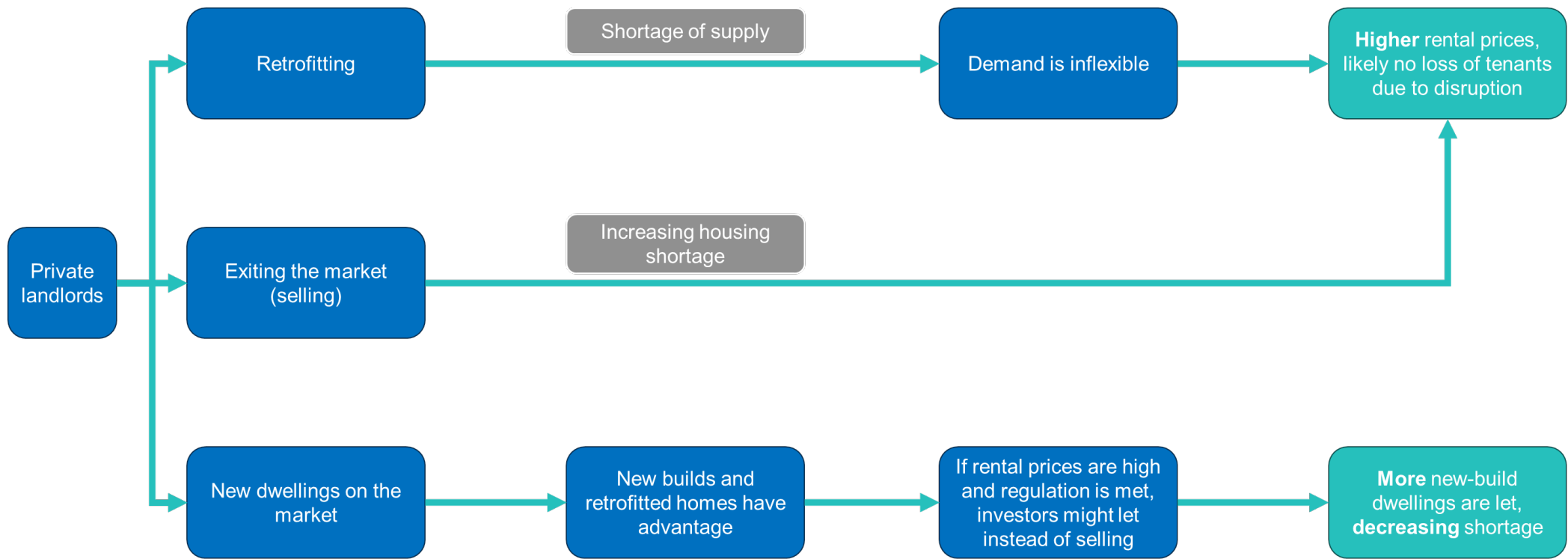


Figure 9: Expected impacts of proposed policies in the consultation on a Heat in Buildings Bill on rental market, core scenario

Colour code: **dark blue** – actions available; **turquoise** – market impact; **grey** – mechanism driver

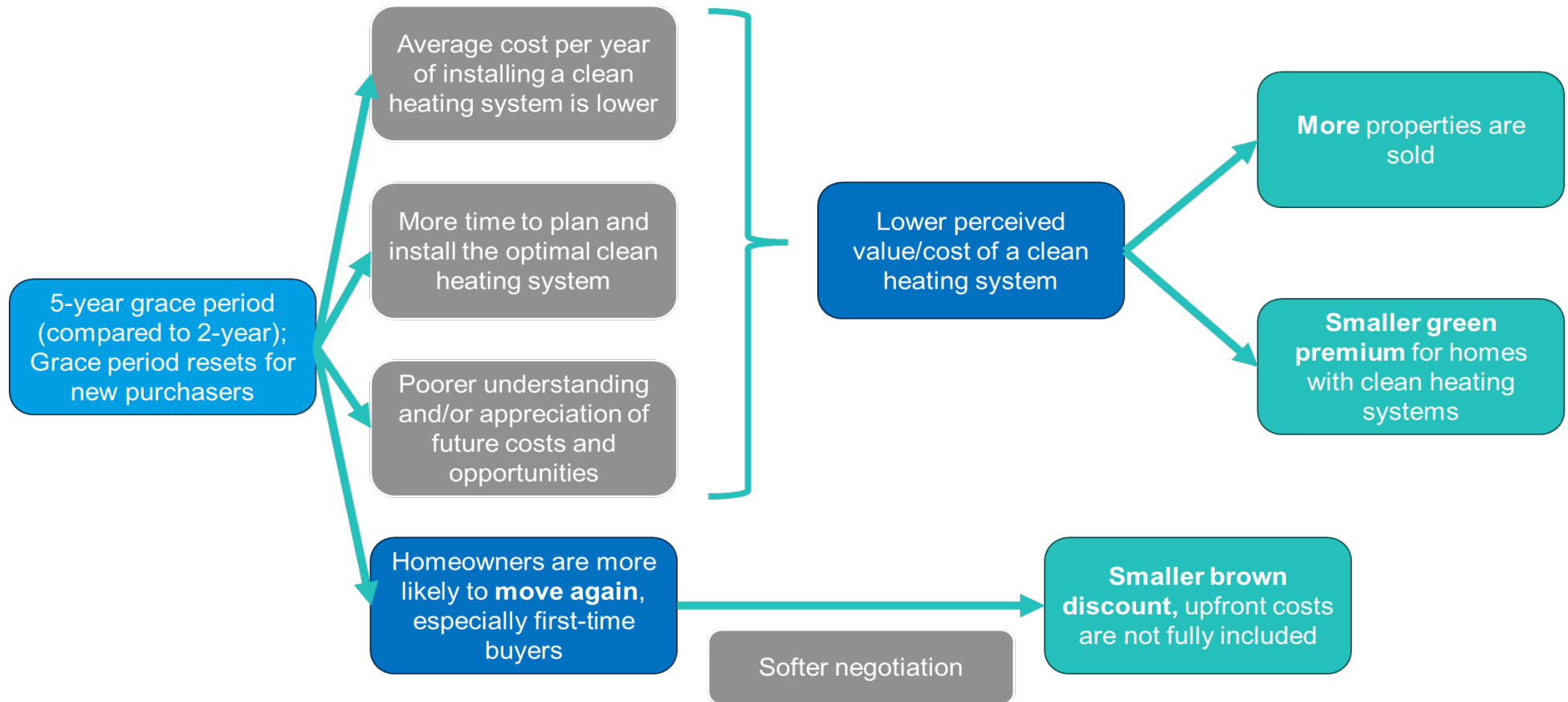


Figure 10: Expected impact of a longer grace period on housing market, S1-B scenario  
Colour code: **dark blue** – actions available; **turquoise** – market impact; **grey** – mechanism driver

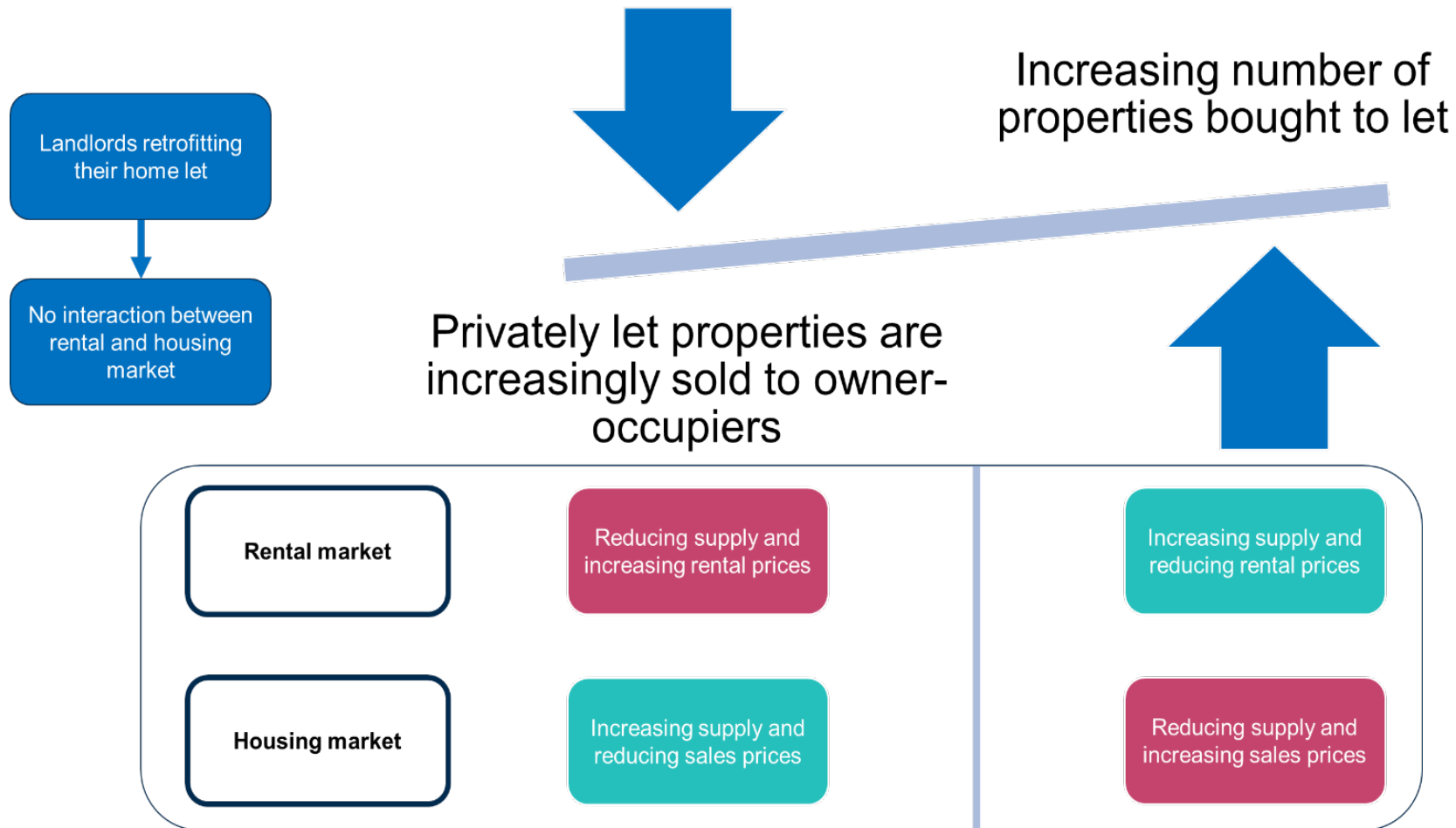


Figure 11: Expected interactions between the sales and rental market under the proposed policies in Heat in Buildings Bill consultation, S1-A scenario

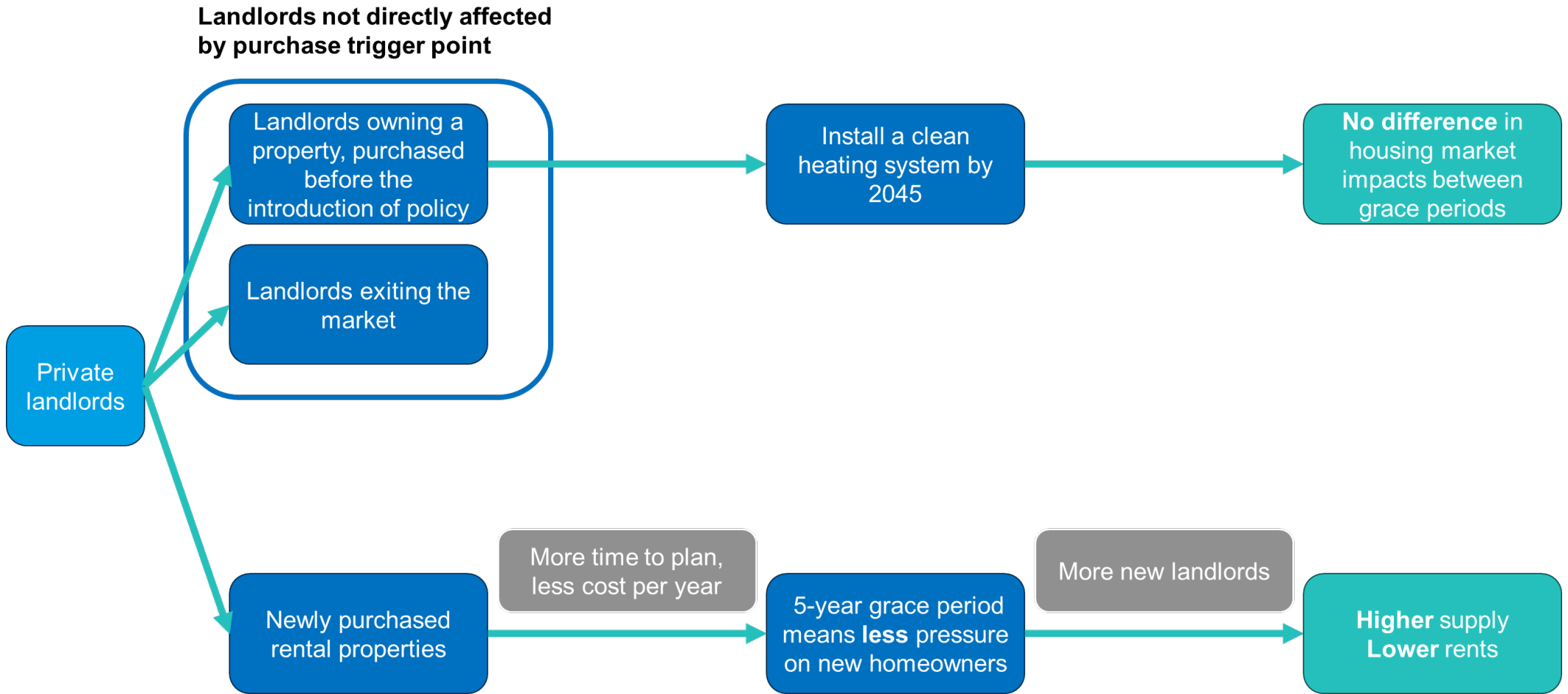


Figure 12: Expected impact of a longer grace period in rental market, S1-B scenario  
Colour code: **dark blue** – actions available; **turquoise** – market impact; **grey** – mechanism driver

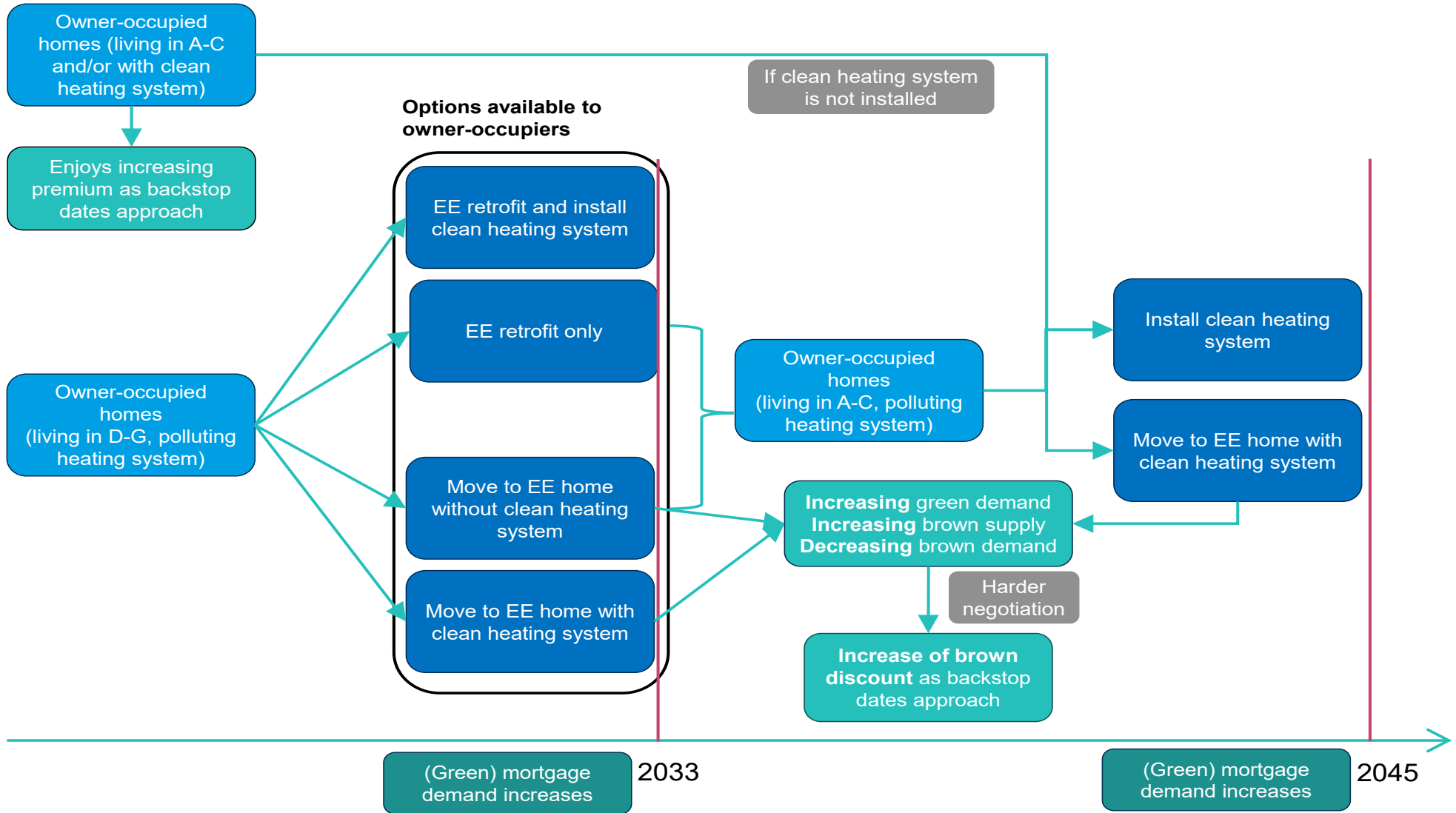


Figure 13: Expected impacts of proposed policies in S2 scenario on housing market

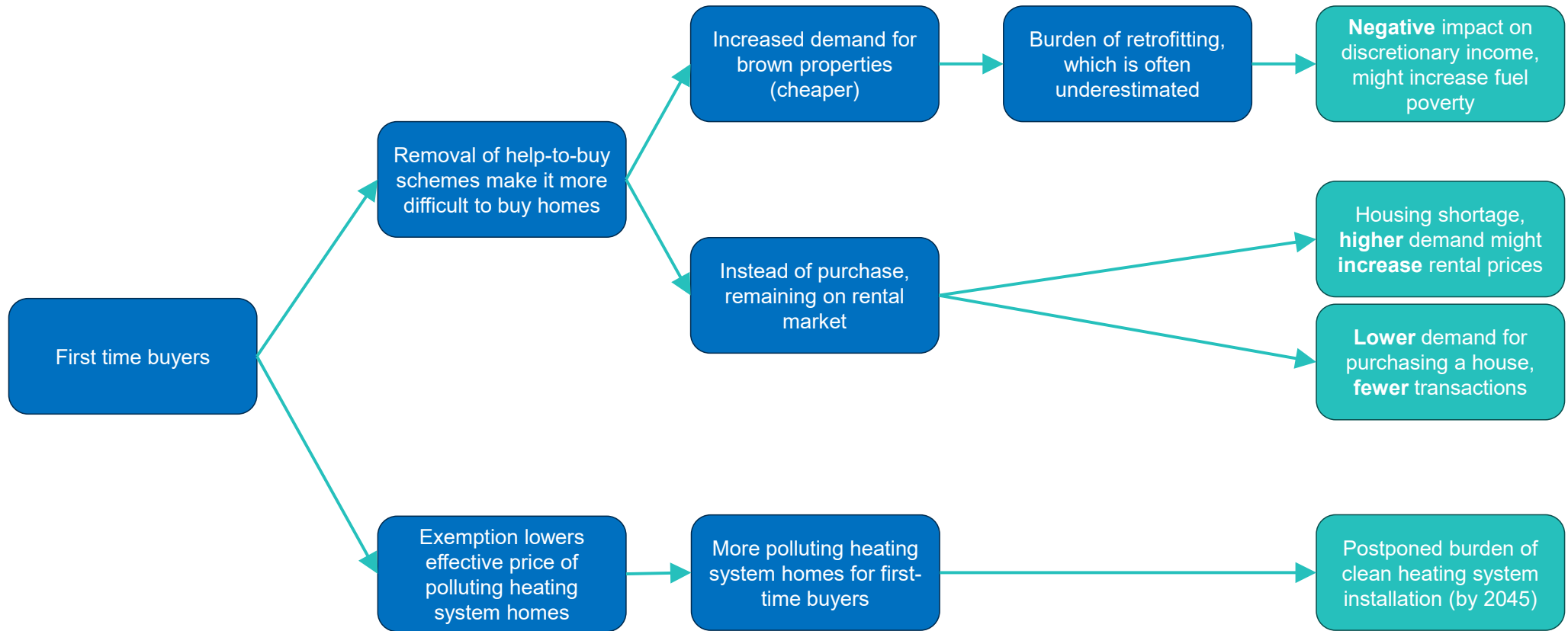


Figure 14: Expected impacts of first-time buyer exemption on housing and rental market, compared to S1

Colour code: turquoise – market impact

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