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Transition policy mixes and business model adaptation: Incumbent firms’ response to zero-carbon policy in the housing sector

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Abstract
This paper provides a firm-level perspective on sustainability transitions by analysing how government can use transition policy mixes to entice industry incumbents to adapt their business model to integrate sustainable technologies. It examines firm-level barriers to policy implementation, why these exist, and how government can use transition policy mixes to overcome them. The empirical analysis provides an in-depth case study of the UK Zero Carbon Homes (ZCH) as a transition policy mix and considers the point of view of policymakers and incumbent housebuilders. The paper sheds light on the question of how transition policy mix designs can support incumbents’ business model adaptation to bring about transformational change for sustainability. The results show that the interaction between various policy shortcomings and business model adaptation barriers led to a failure of government to move the housebuilding sector towards a stronger integration of sustainable technologies. The paper concludes by arguing that decarbonising housing in the UK was a system failure, rather than a market or policy failure, as the government failed to address the underlying reasons of incumbents’ resistance to changing their business model. The findings suggest that taking incumbents’ business models into consideration while designing policies for sustainability transitions is necessary to entice established firms to actively take part in the process of transitions and adapt to new sustainable norms.

KEYWORDS
business model adaptation, policy mixes, sustainability transitions, transition policy

1 | INTRODUCTION

Sustainability transitions refer to complex, long-term change processes from conventional resource-intensive to more sustainable modes of production and consumption (Geels, 2004). Transition processes require systemic change that encompasses technologies, infrastructure, policies, industries and businesses, and cultures and
lifestyles — collectively referred to as socio-technical systems (Markard et al., 2012). Notwithstanding widespread efforts to accelerate sustainability transitions, the rate of change remains slow (Kuokkanen et al., 2018). Despite breakthroughs in the scaling of sustainable technologies, a system transition is complex and rife with uncertainty, power struggles, conflicts, and crisis. Such a transition is so complex because it involves changing the configuration of products, processes, services and infrastructures, regulations, expectations, and actors (e.g., producers, suppliers, policymakers, users) that together fulfill societal needs such as energy, food, or mobility (Baxter & Sommerville, 2011; Geels, 2006). Among transition scholars, there is consensus about the key role of government in creating system change; that is, effective policy mixes can accelerate change in complex socio-technical systems (Kern, 2012; Markard et al., 2016; Weber & Rohracher, 2012). A policy mix is “a complex combination of different policy instruments within different policy fields, levels, regions, and rationales to deal with the complexity and multi-faceted nature of sustainability transitions” (Rezaeian et al., 2024, p. 3). By introducing a mixture of policy measures and instruments, governments can help advance the development and diffusion of sustainable technologies in different sectors and accelerate the transition to a more sustainable economy (Kemp, 1994).

This paper builds on the premise that government intervention is indeed important but that the slow rate of change in sustainability transitions can be attributed to government policy mixes’ narrow technocratic focus (Köhler et al., 2019) and to a failure of government to reckon with firms’ strategic response to these mixes (Bohnsack et al., 2015). While many sustainable technologies are well developed, incumbent firms tend to resist their adoption due to a reluctance to abandon currently successful business models (Bohnsack et al., 2014). Their value creation often relies on old technologies and unsustainable business practices which fuels a response to government intervention which is oriented towards maintaining the status quo (Geels, 2014). The historical success of existing business models creates cognitive and structural barriers to sustainability transitions. The dominant logic, rules, and structures embedded in existing business models lead to strong path dependencies which reinforce incumbents’ strategic course of action not to stray away from and cannibalise on proven sources of value creation (Bidmon & Knab, 2018; Bohnsack et al., 2014; Vernay et al., 2022). As key actors in socio-technical systems, incumbents hold significant market power through their resources, knowledge, and expertise (Simoens et al., 2022); their reluctance to change can thus form a major impediment to sustainability transitions.

While incumbents’ reliance on existing business models can hamper transitions, these actors also have the capacity to accelerate transitions instead by reorienting, changing, adapting, or innovating their business models (Rezaeian et al., 2024). It remains a challenge for government to create the conditions that harness incumbents’ capacity for change and facilitate the integration of sustainable technologies by adapting their existing business models. Climate change’s urgency and the severity of its consequences make it imperative for transition policies to support incumbents in adapting their business models and let them become agents of change in sustainability transitions. In this paper, we examine the influence of transition policy mixes on incumbents’ business model adaptation by addressing the following research question: How do transition policy mix designs support incumbents’ business model adaptation to bring about transformational change for sustainability?

As empirical case, we examine the UK housebuilding industry by analysing how the government’s transition policy mix influenced incumbent housebuilders’ adaptation of business models and the consequences for the sustainability transition in this sector. We focus on the UK Zero Carbon Homes (ZCH) policy mix because it was an “intentionally-built” transition policy mix. However, while it had an ambitious policy target of supporting decarbonisation, it is considered a failed sustainability transition (Edmondson et al., 2020). By analysing what led to the transition policy mix’ failure, we identify how features of a transition policy mix interact with incumbents’ existing business models and explain what role this interaction plays in driving or hindering sustainability transitions. With our analysis, we contribute to the sustainability literature on the interaction between government and business strategy (Smink et al., 2015; Wesseling et al., 2015) by showing how the dynamics between government policy and incumbents’ business model adaptation (or lack thereof) is a key factor in explaining why sustainability transitions succeed or fail. Based on our empirical findings, we suggest that decarbonising new housebuilding in the UK was a system failure rather than a market or policy failure only. It was the interaction between policy shortcomings and a reluctance from incumbents to adapt their business models in response to the policy mix that created system barriers that prevented the transition to succeed. We suggest that governments should take the dominant logic behind incumbents’ business models into consideration when designing policy mixes for sustainability transitions. Governments need to understand how incumbents create, deliver, and capture value to be able to design policies that will entice them to actively take part in the transition process and to be a driving force for sustainability rather than an impediment.

2 | LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 | Transition policies and policy mixes

The complexities associated with sustainability as a public good call for government intervention to shape the direction of sustainability transitions and make it an implementable reality. This argument has been developed in a series of theoretical and empirical studies on the role of government policy in sustainability transitions. Transition policies refer to government interventions to induce sustainability transitions and they often coalesce with other types of government policy such as environmental or innovation policy (Alkemade et al., 2011; Borrás & Edquist, 2013; Del Río et al., 2010).

Previous studies have examined transition policy by looking at the effects of different policy instruments on sustainability transitions:
e.g., technology-specific versus general (Bergek et al., 2014), economic versus regulation and information (Rogge & Reichardt, 2016), and command-and-control versus market-based and voluntary instruments (Bohnscak et al., 2015; Kemp & Pontoglou, 2011). Studies have compared the impacts of different instruments on the rate and direction of technological change to indicate the most prominent instrument to accelerate technological innovation (Bergek et al., 2014; Greene, 1990; Jaffe et al., 2002, 2005). Another strand of literature has analysed the features of policy instruments and their influence on technological innovation. These studies show that features such as stringency and predictability are more important than the type of policy instrument in encouraging, mediating, and directing firms’ responses in terms of compliance and innovation (Bergek et al., 2014; Johnstone et al., 2010; Kemp & Pontoglou, 2011; Rogge et al., 2011; Yin & Powers, 2010).

Discussions about the essential attributes of successful transition policy extend beyond single policy instruments. Turnheim et al. (2015, p. 240) argue that “effective governance of transitions needs to be appreciative of complexity, uncertainty, emergence and asymmetries of power, it needs to mobilise deep analysis and timely data, and involve a broad variety of actors in processes of learning, experimentation, and adaptive adjustment as new facts and perspectives become available.” The complexity of sustainability transitions requires a package of different policy instruments designed for a specific target with specific characteristics such as stringency, flexibility, and predictability. The transition literature calls such a package a “policy mix.”

Studying the interactions between different policy goals, instruments, and processes as a policy mix has become an important way to determine how government might accelerate or hinder sustainability transitions (Flanagan et al., 2011; Kivimaa et al., 2021; Rogge & Reichardt, 2016). Flanagan et al. (2011) highlight the importance of studying policy mixes in transitions by indicating that the emergence of policy mixes can be considered as a window of opportunity to deal with a messy and complex, multi-level, and multi-actor reality. A basic definition of policy mix refers to it as a combination of various policy instruments (Guy et al., 2008; Matthes, 2010). However, Flanagan et al. (2011) argue that a policy mix is more than a simple package of instruments and stress the need to study the processes by which instruments emerge, interact, and influence each other. Real-world policy mixes include multiple instruments in different policy fields, governance levels (vertical and horizontal), geographical regions, rationales, policy processes, and implementations (Flanagan et al., 2011; Kivimaa & Kern, 2016; Rogge & Reichardt, 2016). Rogge and Reichardt (2016) propose a framework in which policy mix elements include policy strategies (policy objectives and principal plans), and instrument mix (policy instruments, their goals, type, and design features). These elements have different characteristics and are designed and implemented in different ways.

While the importance of government policy for transitions is well established, there is little empirical evidence on the impact of policy mixes. The complexity of real-world policy mixes poses challenges for conducting research on their effectiveness (Rogge & Reichardt, 2016). Empirical studies analysing the impact of policy mixes on sustainability transitions remain scarce, as a result (Jackson et al., 2014; Kühler et al., 2019). There are only a few studies that examine how policy mixes can achieve an acceleration of sustainability transitions (Sovacool, 2016) or support the scaling up of niche-level experiments (Turnheim et al., 2018). There is also limited insight into how incumbents respond to policy mixes and what the role is of their existing business models in driving or hindering sustainability transitions (Trotter & Brophy, 2022), a topic to which we turn next.

### 2.2 Transition policy mixes and incumbents' business model adaptation

Business models are important instruments to reduce firms’ social and ecological impacts and support a transition to sustainability (Bocken et al., 2014; Bolton & Hannon, 2016; Boons & Lüdeke-Freund, 2013; Sarasini & Linder, 2018). As discussed, the sustainability transitions literature sees incumbents as a significant source of inertia. According to Lowes et al. (2017), incumbents are existing actors within a socio-technical system who are big players in the market, likely to be involved with old technologies and unsustainable practices, yet have the capacity to affect system change. These powerful actors also have the ability to prevent radical change in socio-technical systems initiated by other actors such as niche-level firms or policymakers. One of the main sources of incumbents’ resistance to change is their established business models as they “hamper transitions by reinforcing the current system’s stability” (Bidmon & Knab, 2018, p. 903).

Business models can also be a force for transformational change, though (Foss & Saebi, 2017; Pinke et al., 2023). Business models capture the relationships of firms with suppliers, customers, and other actors part of the socio-technical system. Incumbents can leverage these relationships to create change. When firms adapt their business model to integrate sustainable technologies, they take part in system change as this involves changing the behaviour of all stakeholders involved. The recent transformation of the energy firm Ørsted from oil and natural gas to offshore wind power is an interesting example of a firm radically adapting its business model towards sustainability. With this move, Ørsted not only changed its main source of value creation but also radically transformed its supply chains and empowered its customers to buy green energy.

To capture the adaptative potential of business models, recent business model literature has moved from a static view on business models which focuses on their main elements and characteristics (Casadesus-Masanell & Ricart, 2010) to a more dynamic view that explores change in business models over time (Foss & Saebi, 2017; Saebi et al., 2017). The dynamic business model literature has two
main strands. The first — business model innovation — explores the creation of new innovative business models as commercialisation tools to disrupt the market (Chesbrough & Rosenbloom, 2002). The second — business model adaptation — studies change in existing business models as a response to external triggers (Denoo et al., 2022; Frishhammer & Parida, 2019). Saebi et al. (2017, p. 569) define business model adaptation as “the process by which management actively aligns the firm’s business model to a changing environment, for example, changes in the preferences of customers, supplier bargaining power, technological changes, competition, etc.”

Business model adaptation is a challenge for firms — especially incumbents — as it usually requires changing several essential elements at once such as value propositions, value delivery, and value capture (Aspara et al., 2013). Barriers such as managerial resistance (Chesbrough, 2010) and ambiguity and uncertainty of external factors (Kennedy & Bocken, 2020; Osiyevskyy & Dewald, 2015; Pinkse & Groot, 2015) make business model adaptation a time-consuming, expensive, and risky process. Given the inherently challenging characteristics of business model adaptation, many firms tend to resist making substantial changes to their existing business models, opting instead to maintain a protective buffer around their established practices. This phenomenon elevates the significance of government intervention. Well-designed policy mixes can enable and incentivise firms to adapt their business models and facilitate the transition towards sustainability.

Despite the recognised significance of business models in sustainability transitions (Bidmon & Knab, 2018), there remains a gap in our understanding regarding the impact of policy mixes on firms’ strategic decisions about business model adaptation due to a greater focus on the role of technology (Foxon, 2011; Lawhon & Murphy, 2012; Trotter & Brophy, 2022). Although dissecting the socio-technical system and establishing solutions might be easier in a technology-centred analysis, it leads to oversimplifying other change drivers such as institutions and non-technological innovations. Moreover, the sustainability transitions literature has been criticised for mainly looking at transitions from a bottom-up approach where innovations come from niche actors such as start-ups (Trencher et al., 2021). Likewise, in the business model literature, scholars have pinned their hopes on niche-level firms to introduce transformational business models (Hockerts & Wüstenhagen, 2010). These strands of literature view incumbents as unsustainable actors locked into their existing assets and institutions, either hindering innovations or only engaging in incremental innovation (Geels, 2006; Kiwimaa et al., 2021). Yet, there is a growing attention in the transitions literature for how incumbents respond to transition policies and deploy various strategies such as lobbying, donating to political campaigns, or shaping public discourse to either accelerate or slow down transitions (Fagan-Watson et al., 2015; Geels & Verhees, 2011; Hess, 2016; Konrad et al., 2012; Lindberg et al., 2018; Smink et al., 2015). More insight is needed, therefore, into the influence of incumbents on sustainability transitions and what role the dynamics between government policy and incumbents’ business model adaptation play in this regard.

3 | RESEARCH DESIGN AND METHODOLOGY

3.1 | Empirical setting and UK housing incumbents

Housing provision has always been a controversial and political issue in the UK, facing two major challenges: affordability and sustainability (Barker, 2004; Stern et al., 2006). The alignment of the quantitative situation of the housing stock (affordability) with qualitative aspects (sustainability) has become a major focus in housing and planning policy (Carmona, 2001). The unique characteristics of the UK housebuilding industry have made it very different from other manufacturing industries. The effect of inelasticity of land supply on housebuilders’ competitive behaviour sets it apart from other sectors (Roy & Cochrane, 1999). That is, a few powerful incumbents — called volume housebuilders2 — dominate the UK housing market and have an oligopoly of a speculative business nature (House of Lords, 2016). Halligan (2021) outlines four characteristics of the UK’s private housebuilding sector which are problematic and in need of reform: the slow build-out, market domination, land banking, and lobbying.

The UK housing market is dominated by a few volume housebuilders. Compared to almost 50 years ago when small housebuilders had a significant contribution to the regional economies by building new homes, the UK housing market is now dominated by a few volume housebuilders (CMA, 2024). Between 2008 and 2015, the market share by volume developers doubled to almost 60% and the share of SMEs decreased sharply (McGuinness et al., 2018). This not only reduced efficiency of the housebuilding industry but also led to fewer units being built each year which can be considered a market failure (Griffith, 2011).

One of the important features of the UK housing industry is the delay between obtaining planning permission and building houses. This delay used to be due to the UK’s planning system and its strict planning laws and complex regulations. However, since the introduction of the National Planning Policy Framework in 2012, the number of granted planning permissions has increased significantly which makes the planning system much less of a barrier compared to the past (DCLG, 2012). While the planning permissions granted have increased significantly, the number of houses built has risen far more slowly. This gap reflects the extent to which large housebuilders have the financial and legal power to obtain land planning permissions (Walker, 2017), sit on such lands, and then “drip-feed” new homes to the market to keep prices high and have greater overall profitability (Halligan, 2021, p. 84).

Land banking, a strategic practice in real estate, involves acquiring land, securing planning permission, and holding it for future development or sale at an appreciably increased in price. In the UK, incumbent housebuilders have perfected this art, making it a cornerstone of their business model which includes identifying, acquiring, preparing, developing, and selling land (Callcutt, 2007; CMA, 2024). In 2021/22,

2Housebuilders that build more than 2000 homes a year.
over 60% of new homes were constructed using the “speculative model” of housebuilding (CMA, 2024). This unique business model has been discussed in many studies either as a rational response by housebuilders to future market uncertainty (Letwin, 2018) or as a cynical act to constrain supply and speculate on rising land values (Halligan, 2021).

The other important feature of the UK housebuilders is their lobbying power. Incumbents, when faced with unwelcome change, often resort to lobbying as a defensive strategy (Fagan-Watson et al., 2015). In the case of UK housebuilders, their political clout—exerted through corporate donations and lobbying efforts—has significantly shaped housing policies. By leveraging their influence, they strive to maintain the status quo and thwart substantial market shifts. Notably, the property sector’s substantial contributions to successive UK governments underscore the potency of this lobbying mechanism (Halligan, 2021). The distinctive features of the UK housing industry and its incumbents create a fruitful context to analyse the dynamics between government policy and incumbents’ business model adaptation and its impact on sustainability transitions.

3.2 | The ZCH policy mix

In 2006, the government designed a set of housing and environmental policies (policy mix) with an ambitious target of moving to zero-carbon housing by 2016. The Department of Communities and Local Government (DCLG) published the consultation “Building A Greener Future: Towards Zero-carbon Development” to set the plans and timetable for moving towards zero-carbon development and contribute to the target to reduce carbon emissions by 60% by 2050 (HM Treasury, 2007). The government introduced a package of policy instruments and measures to support this ambition (DCLG, 2006). The mix consisted of regulatory (Building Regulation), economic (tax stamp duty exemption, eco-towns, carbon challenge, and fundings for AIMC4 and zero-carbon hub), and information instruments (zero-carbon taskforce, the Code for sustainable homes, AIMC4, and zero-carbon hub). However, the policy mix was scrapped before reaching its target year.

This policy mix has been the subject of policy debates and academic studies (Edmondson et al., 2020; Greenwood, 2015; O’Neill & Gibbs, 2020). Recent studies have highlighted the policy process, explaining the evolution and implementation of the policy mix (Edmondson et al., 2020; Greenwood et al., 2017). With our analysis, we complement previous research by investigating the ZCH transition from a policy and firm-level perspective. We seek to uncover the underlying reasons for the ZCH failure by looking at the impact of incumbents’ attempts to protect their business model against the government’s intervention with its policy mix.

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<thead>
<tr>
<th>Policy instrument</th>
<th>Source</th>
<th>Quantity</th>
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<tr>
<td>Code for sustainable homes</td>
<td>Government sources</td>
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<td></td>
<td>Newspapers and trade journals</td>
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<td></td>
<td>Academic papers</td>
<td>23</td>
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<tr>
<td>Eco-towns and carbon challenge</td>
<td>Government sources</td>
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<td>Academic papers</td>
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<tr>
<td>Building regulations</td>
<td>Government sources</td>
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<td></td>
<td>Newspapers and trade journals</td>
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<td>AIMC4</td>
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<td>Zero-carbon hub</td>
<td>Government sources</td>
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<td>Tax stamp duty exemption</td>
<td>Government sources</td>
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3.3 | Data collection and analysis

The study focuses on the UK ZCH policy mix and housebuilder incumbents’ response to it. We analysed the operation of building new houses, excluding considerations related to retrofitting activities and associated business models. We drew on multiple data sources: (a) archival data including policy documents, newspapers, trade journal articles, academic papers, housebuilders’ reports, business models, and websites and (b) semi-structured interviews with housing policy experts, housebuilders, and academics.

We used three types of archival data source to gain insight into the policy mix. First, we used UK government policy documents published between 2006 and 2016. These documents were collected from the UK Government Web Archive, Ministry of Housing, Communities and Local Government (MHCLG) policy papers and consultations, and the UK Parliament publications. Second, newspapers (Financial Times, The Guardian, and The Times) and trade journals (Building, Planning, and Building Design) were accessed through
the Factiva database to gain additional information about each policy instrument. Third, academic papers related to each policy instrument and ZCH were analysed. Table 1 lists the archival data about the policy mix. We also collected archival data about housebuilders’ business models and strategies, including annual reports, socio-economic footprints, sustainability frameworks, corporate responsibility reports, and business models by accessing the websites of volume housebuilders.

We used semi-structured interviews to obtain retrospective and real-time accounts from three groups: policymakers, housebuilders, and academics (see Table 2). We selected interviewees based on their expertise and experience in the UK housebuilding sector. We conducted the interviews between April and October 2021. The first group of interviewees, policy experts, were selected from The Ministry of Housing, Communities and Local Government (MHCLG), Department for Business, Energy, and Industrial Strategy (BEIS), National House Building Council (NHBC), Building Research Establishment (BRE), and Zero Carbon Hub. The second group were volume housebuilders. Given that we focus on incumbent firms, it is important to note that the number of incumbent housebuilders in the UK is relatively small — 11 housebuilders based on the recent report by the Competition and Markets Authority (CMA, 2024). To gather insights, we reached out to all these housebuilders, and four of them agreed to take part in our study. This was accompanied by interviews with members of the Home Builders Federation (HBF) — the representative body of the home building industry in England and Wales that accounts for 80% of all new homes being built. The third group were academics with expertise on UK housing policy and relevant publications in the field.

The archival data and interview transcriptions were coded using the Gioia methodology (Gioia et al., 2013) in three steps. First, the raw data were manually analysed through “open coding.” The documents related to policy instruments were coded separately at first to scrutinise their content, and then, the whole policy mix was analysed to investigate the interactions between each instrument. Almost 70 concepts were identified in the data which remained as close to the data as possible. We then reduced these concepts into a more manageable number of 16 first-order themes through axial coding (Strauss & Corbin, 1998). For instance, we combined the concepts of “the possibility of higher emissions as a result of new transportation for eco-towns”, “counterproductive nature of emission reductions in eco-towns in providing employment and infrastructure” and “bigger emission reduction alternatives in retrofitting the existing housing stock” into one first-order theme: “lack of concrete justification for policy intervention types.” In the second step, going back and forth between relevant literature and the data, the themes were categorised into eight second-order constructs, which shed light on why the policy mix failed. For example, we clustered the first-order themes of “ambiguous definition and characterisation of ZCH as a policy target” and “lack of concrete justification for policy intervention types” together as they are both talking about the lack of clarity of the policy instruments and in general the policy mix. The final step was building a data structure and group codes into two aggregated dimensions following a classic abstraction process (see Figure 1).
Using the relevant theories in both transition policy and business model literature, we concluded that the main reasons of the policy mix failure are related to the shortcomings in the design and implementation of policy mix as well as the business model adaptation barriers. The first four constructs relate to the shortcomings of the design and implementation of ZCH policy mixes and the last four to the barriers to incumbents’ business model adaptation. These aggregate dimensions provides a high-level answer to the question what needs to be considered in the design and implementation of a transition policy mix to support incumbents’ business model adaptation to bring about sustainability transitions.

4 | FINDINGS

4.1 | Policy shortcomings

The ZCH policy mix, while being considered a unique and ambitious policy package for sustainability, has been the subject of significant criticism. In this section, the four macro-level constructs of ZCH policy shortcomings and their associated factors are discussed.

4.1.1 | Clarity

**Ambiguous definition and characterisation of ZCH as a policy target**

The first issue that was raised in the early days of the ZCH programme was the lack of clarity regarding the target’s definition and its practical implementation. Housebuilders, in their response to policy consultations (DCLG, 2007a, p.14), emphasised that:

... the way in which zero carbon is defined will have a major impact on the costs and deliverability of zero carbon homes within the timetable specified [10 years].

To address this challenge, the government established the Zero Carbon Hub — an autonomous research group tasked with reddefining the target and identifying and overcoming potential barriers. However, this process was time-consuming and introduced uncertainties at the early stages of the programme.

**Lack of concrete justifications for policy intervention types**

Housebuilders and other stakeholders within the housebuilding industry sought more evidence to be convinced that the proposed...
solutions would be sustainable. One critical debate was centred around the significance of retrofitting the existing housing stock versus constructing new homes in terms of environmental impact (DCLG, 2008, p.10):

Existing housing stock, which contributes 27 per cent of the UK’s total carbon emissions, has the potential to help achieve the Government’s overall target to reduce carbon emissions by 60 per cent by 2050. The Government needs to maintain an appropriate balance between new build and regeneration.

The eco-towns programme faced similar ambiguity. Stakeholders expressed the need for greater clarity about the government’s expectations and promises. Questions arose about the proximity of facilities, the 50% target for affordable housing, the job creation potential of the sites, and the stated zero-carbon credentials (DCLG, 2007b). The ambiguous eco-town proposal and the unclear guidance to achieve it made it be perceived as “a mere statement of intent” rather than a well-thought, reality-based policy instrument.

4.1.2 | Comprehensiveness

_Inadequate policy action to destabilise the industry_

For incumbents to change their business models in a supplier-driven market such as the UK housebuilding industry, it is not only necessary to provide support for sustainable technologies but also to ban or remove support for unsustainable ones, thereby destabilising the prevailing systems. As Greenwood et al. (2017, p.490) argue, “[a] strong, central role for government in setting national, mandatory standards and supporting their delivery” is required to mainstream sustainability in the UK housebuilding industry.

Building Regulations, while positioned as an important instrument in the ZCH policy mix, did not sufficiently shake up the industry. The inconsistent planning and implementation of tightening the emission standards in 2013 is an example of softening the only regulatory instrument involved in the programme. The Zero Carbon Hub recommended nearly a 50% reduction in emission standards, yet the government opted for a mere 6% reduction after a protracted consultation process in 2013. This decision, even below the consultation values, was justified by concerns over regulatory costs potentially burdening home builders during the economically challenging period (HM Government, 2013).

The UK housebuilding industry, characterised by powerful incumbents and an oligopolistic nature, presented unique challenges for policy interventions. While a single regulatory instrument nudged firms toward sustainability, it fell short of fundamentally reshaping the system. As Interviewee P1 stated:

_The regulations could push firms to become more sustainable to a certain degree. [...] Were these interventions of such a scale that they can fundamentally change the system? No. We have got the major housing developers sitting on billions of pounds worth of land. And the scale of our interventions is tiny compared to that._

This problem was also highlighted by the Callcutt (2007), stating that unless the legislation is credible, sustained, clear, and enforced, it may act as a barrier to transitions (Callcutt, 2007). A stronger governmental role, coupled with decisive policy actions, is crucial for driving sustainability and disrupting established norms in the UK housebuilding industry.

4.1.3 | Coherence

_Lack of inter-policy coordination among involved government departments_

The multifaceted construction industry involves a complex interplay of policy departments including the MHCLG, Department for Business, Energy, and Industrial Strategy (BEIS), Department for Environment, Food and Rural Affairs (DEFRA), Department of Business, Enterprise, and Regulatory Reform (DBERR), and HM Treasury. While the importance of coordination between departments has been stressed (see for example Rogge & Reichardt, 2016), the ZCH policy mix was criticised for the confusing and rather conflicting role of these departments in achieving the 2016 target. In a parliament committee debate over the draft stamp duty land tax regulations in 2007, one of the committee members stated (House of Commons, 2007):

_Under the Economic Secretary’s predecessor, relations between the Treasury and DCLG were completely harmonious, providing a model of constructive marriage between departments. I am sure that the relationship is still close, but will she [Economic Secretary to the Treasury] confirm whether it will be HMRC, DCLG, DEFRA or DBERR that takes ownership of any future revisions to the regulations, since all four presently have a piece of the pie, or whether developers will continue to be condemned to death by acronyms?_

_Weak coordination across national and sub-national levels_

The coherence of policy efforts within the ZCH initiative faced significant hurdles due to weak coordination across national and sub-national levels. Under Planning Policy Statement 1 on planning and climate change, local authorities were granted autonomy to set their own sustainability-based planning objectives and targets such as minimum levels of on-site renewable electricity generation. However, this created inconsistency between local and national objectives and a lack of stringency in reducing emissions (Greenwood, 2012). In the

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6 Financial Times (2008): _An eco-town on greenfield site is unsustainable_

7 Financial Times (2009): _You don’t have to change your lives_ – In the words of Bill Oliver, the chief executive of developer St Modwen, “too much thought has been given to the idea of an “eco-town” and not enough to the reality of the concept”.

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The eco-town policy instrument and many local authorities were among the whole policy, ultimately leading to its dismantling. Eco-town policy was criticised for overlooking the role of local authorities (DCLG, 2008, p.34) and their capability to handle it (DCLG, 2008, p.31):

Local authorities need to be involved in this process from the earliest stages, and this must include an analysis of alternative approaches to accommodating development. [...] Eco-towns are coming forward at a time when local authorities are going through significant transitions, and this is likely to impact their ability to deal with the eco-town initiative.

4.1.4 | Credibility

Inconsistency in the implementation of ZCH

One of the factors that hindered housebuilders from adapting their business models was the government’s stop-start approach, including frequent changes in housing ministers. The issue was particularly pronounced for zero-carbon homes due to policymakers’ short-term horizons, influenced by “electoral cycles.” One government would initiate a policy, but its progress would be hindered. Instead of instead of addressing the challenges, the subsequent government would “water down” the whole policy, ultimately leading to its dismantling (P3, P4). These abrupt shifts raised doubts about the policy’s credibility and reduced industry confidence.

In the case of eco-towns, the government initially announced building five eco-towns, which were later increased to ten in 2007. However, almost 1 year later, Margaret Beckett, the housing minister at the time, described the plan of building 10 eco-towns as “more of a hope than a firm target.” By 2010, the government scaled back the initiative to four sites (DCLG, 2009b). Additionally, due to the change in government, the promised £60 million funding for the eco-towns was halved. These frequent political and policy shifts introduced uncertainty and diluted the commitment of both the government and housebuilders toward implementing eco-towns. Consequently, housebuilders found it insufficiently reliable to invest in devising detailed plans for a proposal that might not get accepted, in a programme that might be dismantled completely in the future. According to Interviewee 1:

It [watering down the target] did both disappoint and reduce the industry’s confidence in the government in setting policies and sticking with it because they just dropped it without trying to make it work.

Policy loopholes and potential circumvention by incumbents

The other problem undermining the credibility of the policy mix was the presence of various loopholes. For example, the measures to evaluate the performance of new homes only covered the design stage, creating a disconnect between the intended design and the actual as-built performance (DCLG, 2013). This gap inadvertently allowed housebuilders to exploit it as a loophole: after receiving certification for their design, they could opt for cheaper and less sustainable construction methods (P4, P6). The original intent was to lock in energy-efficient designs, thereby reducing future retrofitting costs. However, the lack of post-construction assessment meant that less sustainable houses found their way into the required retrofitting stock. In the words of Interviewee A1:

There is no point in laying down the regulation if you have no means of seeing whether people are complying with it. Unfortunately, even tragedies such as Grenfell Tower can be tracked back to non-compliance and insufficient inspection.

In 2014, the government also updated the off-site carbon abatement measures, i.e., allowable solutions. Housebuilders had four compliance routes under the Building Regulations: on-site or connected measures, off-site carbon abatement actions, off-site carbon abatement through a third party, and payment into a fund which would be invested in carbon abatement projects. The government announced an exemption for small sites to “ensure that small housebuilders do not face unreasonable extra costs” (DCLG, 2014, p.5). This paved the way for housebuilders to circumvent the regulation by either paying for the allowable solutions or limiting their construction units to meet the small-scale exemptions. They found these options much easier to achieve than the carbon compliance standards.

4.2 | Business model adaptation barriers

Although there is a growing consensus that the housebuilding industry requires major reform, the nature of such reform has mainly been on technological specifications and design standards while the organisational challenges have been neglected (Greenwood et al., 2017). To analyse the policy mix problems from the incumbents’ perspective, in this section, firm-level barriers are discussed which are associated with the incumbents’ business models. Considering zero-carbon homes as a novel value proposition for incumbents’ business
models, we categorise the business model adaptation barriers into four categories: feasibility, desirability, viability, and externality. Feasibility pertains to the value delivery within business models, encompassing critical activities, partnerships, and technologies. Desirability addresses market and customer-related issues. Viability encompasses critical activities, partnerships, and technologies. Externality explores problems arising from the environment surrounding incumbents’ business models.

4.2.1 | Feasibility

Relative disregard of supply chain actors

The housebuilding industry operates in a complex network of partners, each wielding influence over design, processes, and outcomes (Hoffman & Henn, 2008). However, achieving systemic change requires collaboration across this diverse ecosystem, as performance relies on a well-functioning network (Gann & Salter, 2000). According to Interviewee P3:

“The process of constructing a house is essentially an assembly process which brings inputs together from a wide variety of suppliers from quite a range of interests and disciplines. This means if you are looking for a breakthrough change, you have to bring all these people together to consider all that matters. You can’t just focus on what the ultimate assemblers are doing without acknowledging the suppliers.”

The ZCH policy mix compelled housebuilders to adopt innovative technologies such as solar PV, wind turbines, and heat pumps. This led to two supply-chain challenges for the housebuilders. First, housebuilders expressed reservations about the maturity and reliability of these new technologies. The adoption of unproven solutions carried inherent risks and the potential for increased construction and maintenance costs (P2, P5, P6, I1, I2, I3, A2). Second, to implement zero-emission supply solutions on-site, housebuilders needed to establish partnerships with technology suppliers, including micro-generation technologies which contained an element of risk. Initially, the government facilitated such partnerships through the Zero-Carbon Taskforce, where major UK energy firms explored engagement with zero-carbon homes alongside the housebuilding industry. However, the Taskforce fell short in representing the Renewable Energy Association (REA) and left a gap between housebuilders and the micro-renewables industry (Edmondson et al., 2020).

Public-private partnerships play a crucial role in building networks and partnerships and are considered a legitimate governance mode for addressing complex problems such as climate change. Within the ZCH policy mix, the AIMC4 project was employed for this task. This groundbreaking collaboration facilitated a high level of communication and trust among all stakeholders in the supply chain. It demonstrated how bringing developers and suppliers together can “instigate a step change in supply chain innovation by stimulating the collaboration” (Cartwright & Gaze, 2010, p. 5). The project “built internal trust, and [...] draw suppliers into an open relationship with the consortium and between each other, even if they competed in the same field” (Cartwright & Gaze, 2010, p. 2). The integrated design and collaboration between developers and suppliers resulted in significant advancements, not only for technical solutions but also for process and market innovations. However, according to Interviewee I4, AIMC4 should have been implemented much earlier in the ZCH policy mix. According to Interviewee I4:

“Having AIMC4 in earlier stages of ZCH could reduce many uncertainties and risks we had to deal with in that time. Personally, I believe, that should have happened even before the policy [ZCH] was announced. That could also help policymakers to see how feasible their expectations are.”

Unrealistic timeframe

The ZCH policy mix set a 10-year plan for the new homes to be completely zero-carbon. During this period, the code for sustainable homes provided a roadmap towards zero-carbon homes through the Building Regulations. However, early-stage ambiguities surrounding target definitions and certification processes posed challenges. Housebuilders and other involved stakeholders needed ample time to grasp the assessment and certification requirements. A critical stumbling block was the lack of a more realistic timeframe for achieving zero-carbon homes, resulting in uncertainty, increased costs, and delays in the completion of certification (P4, I1, I2, I3, A2, Osmani & O’Reilly, 2009).

Insufficient knowledge, capability, and skills for adaptation

To comply with the zero-carbon policy mix, housebuilders had to acquire essential information and knowledge, fostering internal capability and transforming their business practices. However, the industry’s complex supply chain posed challenges for disseminating new knowledge, skills, and expertise. As a result, there was a substantial knowledge, skill, and networking gap among supply-chain partners. This gap often led to a preference for more routinised low-risk solutions over more sustainable alternatives (P4, I6, Mokhlesian & Holmén, 2012; Schweber et al., 2015).

To provide assistance, the government initiated the Callcutt Review, aiming to “highlight the skills needed in the housebuilding industry to make sure that housing supply targets are met whilst achieving the higher environmental standards” (DCLG, 2007a, p.21). However, this guidance alone fell short of enabling housebuilders to swiftly develop internal capabilities in a limited time (I2, I3, I4, I5, Hashemi & Hadjiri, 2013; Heffernan et al., 2015). Although AIMC4 facilitated knowledge sharing among supply-chain partners, it provided innovative solutions only to comply with Code level 4 (44% emission reduction). For the higher levels of the Code, housebuilders had to employ renewable energy technologies to meet the dwelling’s thermal and/or electrical demands. Developers often found these demands beyond their capability, leading them to lobby for less
stringent requirements. In the case of eco-towns, housebuilders pressured the government to abandon Code Level 6 requirements, advocating for Code Level 4 instead (DCLG, 2008). The perceived low feasibility of eco-towns affected their credibility (see section 4.1.4), creating a perception that the government prioritises housing shortage over sustainability. It also encouraged housebuilders to circumvent the policy by reviving previously rejected proposals to secure planning permissions (P2, P4, P5, P6).

4.2.2 Desirability

Low demand for zero-carbon homes

As mentioned, the UK housebuilding industry suffers from two issues: sustainability and affordability. The Calcutt (2007) stated that in the UK, the preference for price, size, and location outweighs the preference for sustainability and energy efficiency among homebuyers. Low demand for zero-carbon homes made the market less appealing for housebuilders to invest in. The government implemented several initiatives to stimulate demand by incentivising homebuyers with instruments such as stamp duty exemption, reduced value-added tax, and a landlord energy-saving allowance. The government believed that (DCLG, 2007c, p.41):

"[t]he more that on-going costs and benefits to households can be built into buying decisions, and therefore house prices, the more developers will be incentivised to respond by building to higher efficiency and sustainability standards."

Several benefits were highlighted to encourage people to buy zero-carbon homes. The economic advantage resulted from the reduced energy bills due to improved energy efficiency, as well as potentially lower fuel costs from renewable sources. However, most housebuilders observed a lack of demand and appreciation for zero-carbon homes amongst the general public (I1–6, Osmani & O’Reilly, 2009). In the words of Interviewee I5:

"The problem is whether the money comes back fast enough for the people to benefit. The payback time is a very real issue. It’s an even more accurate issue in rental properties because the improvements will cost the landlords, but the benefits go to the tenants who pay the energy bills."

Moreover, the initiatives related to eco-towns and the carbon challenge created friction. In a summary of the 2008 consultation response document, the government revealed that at least one-third of the responses were postcards and petitions from campaigners and protest groups against some of the proposals (DCLG, 2008). Besides, housing additionality was one of the key concerns as there was no compelling evidence that the housing market was strong enough to deliver the level of additional housing being advocated (DCLG, 2008).

During the recession, when developers faced the worst collapse in the housing market in decades, some eco-towns struggled to achieve the critical mass required to support a stand-alone sustainable community. According to Interviewee I2:

"Installing expensive green technologies to build zero-carbon homes, such as ground source heat pumps and solar panels was not reasonable for us when there was no or little market value in return."

The stamp duty exemption was not successful either, in attracting more customers for zero-carbon homes. Although it seemed an attractive bonus for prospective homebuyers, it was claimed to have little impact on the demand as “the number of houses to benefit could fill one street.” In a parliament committee debate over stamp duty exemption in 2007, it was stated that (House of Commons, 2007):

"This statutory instrument is quite specific [...] to be eligible for the relief, the homes have to be zero-carbon, so there is no prize for being five-star or four-star. It has to be six-star—zero-carbon. [...] The regulations, well-intentioned though [...] will actually achieve very little."

The AIMC4 project, by highlighting the importance of energy cost savings being reflected in mortgage valuations and affordability criteria, acknowledged that (Cartwright & Gaze, 2010, p. 8):

"[t]he lower running costs of AIMC4 and other modern homes have not had a significant impact on the market. Until they do, new homes with energy performance better than Regulation will remain the exception and not the norm."

Lack of necessary societal behaviour change incentives and education

Another challenge related to zero-carbon homes was the lack of necessary incentives for societal behaviour change and education. Homebuyers needed better awareness of the benefits of zero-carbon homes, as energy efficiency gains were less significant for homebuyers than other aspects (Greenwood et al., 2017). The uncertainty and lack of knowledge surrounding green technologies and the perceived costly maintenance made customers reluctant to buy zero-carbon homes. Many firms acknowledged the need for behavioural change among homebuyers as the performance of such houses depended heavily on the way occupants use their homes (DCLG, 2008). The AIMC4 project raised this issue:

15 Financial Times (2008): Only one eco-town site classed as suitable
16 Financial Times (2006): Exemption from stamp duty seen as token gesture
17 Housebuilder & Developer (2014): AIMC4 – Creating a template for tomorrow’s new home construction
The technical changes to home design resulting from the government’s regulatory pressure did not take into account the reality of consumers’ views and the way occupiers actually operate their homes.

4.2.3 | Viability

Increased construction costs

Housebuilders faced significant increases in construction costs due to constraints related to time, resources, knowledge, and skills. While the government aimed to offset some of these costs by stimulating demand and creating a market for zero-carbon homes, the economic incentives were primarily designed for homebuyers. As a result, additional construction costs initially burdened the housebuilders. The option to pass on costs in terms of reduced prices for land was not achievable in the relatively short period of ten years. Consequently, even with using the Code as a competitive differentiation strategy, the compliance costs with ZCH standards outweighed the benefits of potential demand, resulting in an unsatisfactory revenue stream.

In the context of eco-towns, the government expected that the use of surplus public-sector land, economies of scale, and increases in land value would balance costs and revenues (DCLG, 2009b). The scheme aimed to generate sufficient revenue over the development life-cycle without relying on public funds beyond what was already available (DCLG, 2009a). However, a significant discrepancy emerged between the developers’ proposal—in terms of both the required infrastructure and cost—and the government’s assessment. Building an entirely new town rather than expanding an existing one would inevitably raise the average cost of a house (DCLG, 2008). Yet, housebuilders could not transfer these increased costs to customers, given that 30%–50% of the houses needed to be affordable and the price elasticity was relatively low. From a policy point of view, Interviewee P7, by emphasising the resistance of housebuilders to extra costs, indicated that:

You can go back decades. Any proposal that would increase the price of construction of a house was resisted. Because it upsets their calculations. And the first reaction you get from them is that it will affect the housing supply as they become more expensive.

Interviewee I6 further discusses the problem of the volume housebuilders:

We should be very careful about demonising developers because at the end of the day their companies are there to make a profit. Housebuilders have shareholders and their job is to maximise return to shareholders. In a market economy that is what they have to do. So, you [governments] have got two levers: either you make the market so that they can make money out of being green, or you oblige them by regulation. Sadly, there has always been the second one with lots of flaws and has not been implemented wisely.

It has been claimed that the ultra-competitive land market and high land prices have made it “practically impossible to run a business specialising in low-cost homes, producing large volumes at lower margins” (Halligan, 2021, p. 79).

4.2.4 | Externality

Blocked window of opportunity for SMEs

The UK housebuilding market is increasingly dominated by a small number of large “volume housebuilders.” Their land speculation or land banking19 business model, coupled with lobbying20 efforts, has granted them significant power. They secure the most available planning permissions, boost their stock market valuation, and control the housing supply and its price (Halligan, 2021). According to Interviewee P1:

I think the UK is almost unique in terms of the extent to which the market for land and the provision of land influences every aspect of housing policy, including zero-carbon homes. Any problem relating to housing in the UK and what you want the provision of housing to be in the future, you inevitably get dragged back into this [land market].

This situation hinders SMEs from obtaining planning permissions elsewhere in the same locality. Competing with the large incumbents becomes almost impossible which creates an externality for SMEs as obtaining a share of the market is more difficult for them, as a result. Consequently, the window of opportunity for market change, dynamism, and competition remains blocked, pushing SMEs into niche markets (Gibbs & O’Neill, 2015). According to an inquiry of the House of Lords (2016, p.24):

Since the 1980s we have been relying on the private sector to provide the homes that are needed. The sector, especially since the financial crisis, has all the characteristics of an oligopoly; there are high barriers

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19Land banking is the practice of buying land, applying for planning permission for future sale development, and selling it on much higher prices. Although acknowledged by many studies and reports, as well as the majority of our interviewees, there are still some claims that there is no evidence of land banking among volume housebuilders — e.g. Rt Hon Sir Oliver Letwin, Independent Review of Build Out Rates – draft analysis, June 2018. In this paper, our analysis is based on the majority opinion.

20The property sector has accounted for a big portion of the corporate donations received by successive UK governments (Halligan, 2021).
to entry and the large housebuilders are responsible for a substantial proportion of output.

External barriers for business model adaptation

The 2008 economic crisis and the subsequent recession significantly influenced UK housebuilders’ financial performance, stability, and output, catalysing the worst housing crisis of a generation (KPMG & Shelter, 2015; Payne, 2015). Amid economic austerity, the conservative government initiated policy reforms that eventually dismantled the ZCH policy mix (O’Neill & Gibbs, 2020). Although many volume housebuilders faced financial challenges, the 2008 recession is often seen as an excuse to justify the policy reorientation and prioritise economic growth over sustainability. From a volume housebuilder point of view, Interviewee I1 stated:

The housebuilding industry was not ready for it. Everyone was getting ready to deliver zero-carbon homes. We even participated in projects such as AIMC4. Of course, we were affected by the recession, but we were recovering. I think if the government was really worried about our recovery, it could extend the target year and move it to 2020 for example, instead of killing it off.

Interviewee P7 highlighted that:

It [ZCH policy mix] was scrapped without any consultation. It just bounced back into productization and preference for quantity over quality. That was damaging. Now we have a pile of unsustainable houses being added to the backlog of required retrofitting. The recession undoubtedly had an economic impact on housebuilders. But I don’t think that was beyond control.

As evident from the interviews and archival documents, what led to the dismantling of the policy mix, rather than the recession, was the change of government and its priorities. The elected Conservative-Liberal Democrat coalition government was perceived to have less commitment towards zero-carbon homes in light of austerity and their misperception of the conflict between economic growth and sustainability transitions (O’Neill & Gibbs, 2020). Although dismantlement was opposed by housebuilders and other political parties, the policy mix was officially discontinued in 2016 (Edmondson et al., 2020). The government thus created a negative externality by passing on the costs from dismantling the policy mix to those housebuilders which had started investing in zero-carbon homes.

5 | ZCH AS A SYSTEM FAILURE

The UK housing industry’s transition to sustainability is not merely a market or policy failure (McConnell, 2015) but rather what scholars have called a “system failure” (Markard et al., 2012). This system failure is reflected in the complex interplay of multiple factors and stakeholder interactions that collectively hinder progress towards sustainable housing. The system failure involved various stakeholders in the UK housing industry such as the government, incumbent housebuilders, suppliers, green manufacturers, and customers who all have the power to influence the direction of transition but failed to do so as their interests were misaligned. Our analysis reveals that addressing the system failure requires more than just creating demand for sustainable housing; it necessitates a fundamental shift in the business models of incumbent housebuilders and a realignment of all stakeholders to accelerate a transition in the sector.

Central to addressing the system failure is the need for incumbents to adapt their entire business models in terms of both the internal components such as the value proposition and creation and external components such as the value delivery involving key stakeholders like government, suppliers, and customers (Pereira et al., 2022). The current value proposition must evolve to incorporate sustainability as a core principle without creating costs that cannot be absorbed within an acceptable timeframe. This transformation demands a comprehensive policy mix encompassing economic incentives, regulatory frameworks, and information dissemination to guide and support these changes. When the balance between these instruments is missing, one should expect difficulties in developing as desirable value proposition as costs go up without creating opportunity for differentiation to drive customer demand. Our paper highlights how barriers to business model adaptation related to desirability and viability are a consequence of the housing market’s competitive landscape. Its oligopolistic nature and the power incumbents wield through land banking effectively prevent incumbents to see the opportunity of zero-carbon homes and hinder new entrants to take advantage of this omission by scaling up their sustainability initiatives.

To drive incumbents towards integrating sustainable technologies in their business models, it is imperative to lower barriers for new entrants and increase competition. This competitive pressure can induce an “existential crisis” for incumbents, compelling them to consider sustainability as a business opportunity rather than as an additional cost. However, the ZCH policy mix lacked the enforcement strength (strict regulation) needed to entice incumbents to actively take part in the transition process and break their power.

Another aspect of the system failure lies in the knowledge, skills, and networking gaps that prevent incumbents from seeing how they could overcome problems of feasibility due to a potential misalignment with their stakeholders. The incumbents in our study could not see how they could convince their suppliers, customers, and other stakeholders to move along with them in delivering zero-carbon homes. The policy mix should clearly define policy mix strategies, goals, and guidelines to ensure incumbents can acquire the skills, knowledge, and capabilities to overcome feasibility problems by making changes to the value delivery that realign more sustainable value propositions with supply chain partners, key activities and resources, and customer expectations. Only if the policy mix effectively addresses the knowledge, skills, and networking gaps will
incumbents be able to smoothen the impact of increased construction costs, in the first instance, and avoid adversely affecting the demand for sustainable homes (i.e., value creation).

While government is seen as key actor in solving system failures, our analysis shows that government, by being part of the system, often reinforces the failure instead. The lack of credibility of the policy mix in terms of policy design and implementation is a crucial factor in keeping incumbents convinced that it is near impossible to overcome the feasibility, desirability, and viability barriers of business model adaptation. Frequent changes in policy approaches, ministerial turn-overs, and existing loopholes undermine the trust and stability needed for long-term business planning. A lack of coherence between different policy levels and policy fields further exacerbates this problem, as it creates externalities for housebuilders due to increased construction costs which cannot be passed on to customers. As business model adaptation is both time-consuming and costly, the lack of credible and coherent policies can dissuade firms from pursuing such changes, resulting in resistance to sustainability initiatives. Although market creation prompted incumbents to make some adjustments to their business models to benefit from potential opportunities, due to the interaction between policy shortcomings and firm-level adaptation barriers, the incumbents were not committed to radically changing their core business model. When demand-side support was removed, the ZCH policy became unrealistic as it could not entice the incumbents to overcome the multiple adaptation barriers they were facing.

In exploring the policy aspects of the system failure, our findings suggest that the lack of clarity, comprehensiveness, coherence, and credibility of the ZCH policy mix were in part responsible for discouraging incumbents to adapt their business model and build sustainable and energy-efficient homes. However, policy shortcomings were not responsible for the ZCH’s failure alone. Even if these shortcomings would have been addressed, the policy mix might still not have succeeded due to its narrow focus on technical specifications and not considering the need to address the system failure. A business model ties together all of a firm’s activities for value creation, delivery, and capture (Teece, 2010); trying to change it requires government to assist incumbents in overcoming all four firm-level adaptation barriers that we identified. The analysis showed that when the implementation of a transition policy mix is significantly dependent on support from incumbents in an industry, ignoring what makes their current business model so successful might result in system failure.

6 | CONCLUSION

This paper provides a firm-level perspective on sustainability transitions by analysing how transition policy mixes affect incumbents’ business model adaptation. Although the role of business models in sustainability transitions has been previously studied (Bidmon & Knab, 2018), most studies tend to take a general perspective of business models and transitions instead of looking at the specific role of firms. This study brings a firm-level approach to the sustainability transitions literature, following recent advances in this area (Magnusson & Werner, 2023; Schaltegger et al., 2023; Trotter & Brophy, 2022). By examining the interaction between policy mixes and incumbents’ business models, we investigated the firm-level barriers to policy implementation, why these exist, and how government can use transition policy mixes to help firms overcome them. The zero-carbon home programme enabled us to empirically scrutinise the influence of different building blocks of the policy mix on incumbents’ business models. Although this policy mix was studied before, the analyses focused on a single policy instrument and the impact of policy on technological developments (Edmondson et al., 2020; Greenwood, 2015; O’Neill & Gibbs, 2020). The distinctive features of the UK housing industry and its incumbents create an intriguing context for evaluating and analysing the role of transition policies towards sustainability. In an industry characterised by conservatism and political influence, where incumbents have significant power and provide a fundamental societal need with no viable option to halt production, effecting sustainable change becomes a critical challenge. Therefore, designing a well-crafted transition policy mix that collaborates effectively with incumbents is of utmost importance.

Our study shows how firms’ response to government policy in terms of their willingness to adapt their business model (or lack thereof) plays a pivotal role in sustainability transitions. Even if the policy mix would have been designed differently, incumbents would most likely have resisted policy inducements as the success of their current business models remains a barrier. So long as incumbents cannot envisage how they can engage in sustainability transitions without incurring substantial losses, they will hesitate to fully embrace transition policy. Our study suggests how the traditional way of “innovation behind closed doors” is not a solution for sustainability as it concerns a system failure, not just a market or policy failure. In a complex industry like housebuilding, potential solutions can only emerge through collaborative innovation within supply chains (Magnusson & Werner, 2023). Government can facilitate firms to gather and integrate organisational resources and enable communication between firms and their supply-chain partners to develop joint innovation and speed up the transitions (Xing et al., 2021). To incentivise housebuilders to build more zero-carbon homes and the customers to buy them, being cognisant of the unique characteristics of the housing industry such as the long payback period for zero-carbon homes, the difference between who pays for the costs and who benefits from reduced energy bills, and the dependence of homes’ energy performance on the behaviour of the occupants, plays a big role in driving policy outcomes.

The research has several limitations which open avenues for future research. First, we only focused on the policy mix between 2006 and 2016. Comparing and contrasting new housing policies that were enforced after 2016 to the ZCH policy mix could provide valuable insight for future policies. Second, we used ZCH as a case of a failed policy mix. Considering successful policy mixes in other industries (such as Norway’s policy for electric vehicles) can help to generalise the findings. Further empirical research including the consideration of niche-level firms along with incumbents seems necessary.
to deliver more generalised recommendations for designing and implementing transition policy mixes.

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REFERENCES


CMA. (2024). Housebuilding market study - Final report


Matthes, F. (2010). Developing an ambitious climate policy mix with a focus on cap-and-trade schemes and complementary policies and measures. Öko-Institut.


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