Towards a Retrofit of Care

Examining energy retrofitting in Scottish households through the lens of care ethics.

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Executive Summary

This insights paper sets out to explore a pressing and complex challenge within the field of climate action: how to ensure that energy retrofit efforts are undertaken with sufficient care. Despite retrofit's pivotal role in addressing domestic greenhouse gas emissions, evidence from Scotland suggests that poorly executed retrofits are causing real harm, manifesting in damp, mould, tenant distress, and even reduction in property values. These failures, though often discussed in technical or economic terms, reveal a deeper systemic issue: a widespread absence of care in energy retrofit planning and delivery. Against this backdrop, our study offers a new perspective by asking: *how caring is Scotland's approach to energy retrofit?*

The critical gap this paper addresses lies in the ethical and relational dimensions of retrofit, which remain underexplored despite growing recognition of the need for socially equitable transitions. Dominant policy frameworks for advancing retrofit in the UK are rooted in models which presuppose rational decision-making (Abrahamse & Shwom, 2018) and have limited capacity to examine the affective, political, and interpersonal natures of retrofit delivery (Middlemiss et al., 2024). While care ethics has gained traction in other domains of sustainability transitions, no prior study has applied this framework systematically to energy retrofit, nor across multiple institutional levels. We employed Joan Tronto's five elements of care (caring about, caring for, caregiving, care receiving, and caring with) as an analytical lens to evaluate the Scottish retrofit landscape. Our central aim was to assess how well different actors within this system recognise, respond to, and support the needs of those affected by retrofit interventions.

Our methodology was guided by a document-based qualitative approach, combining secondary data from academic and grey literature. We selected four illustrative case studies to represent the multiple scales and varied nature of retrofit delivery: the Scottish Government's national retrofit strategy, nation-

al non-state organisations (NNSOs), neighbourhood-level retrofit initiatives, and homeowner-led retrofit activities. Data were analysed thematically, coded against the five dimensions of care, and triangulated by multiple researchers and data sources to ensure analytical rigour.

Our findings reveal a striking pattern of care deficits across all institutional levels. While certain actors demonstrate attentiveness, particularly the Scottish Government and NNSOs, there is limited evidence of sufficient responsibility, competence, responsiveness, or reciprocity in the implementation of retrofit initiatives. In the government case, although policy rhetoric reflects strong commitments to a just transition and fuel poverty reduction, implementation falters due to under-resourcing, political tensions, and unclear accountability mechanisms. NNSOs often demonstrate technical expertise and engagement capacity, yet their impact is limited by fragmentation, weak feedback loops, and inconsistent coordination with other actors. At the neighbourhood level, social sector actors often embody more relationally attentive and participatory approaches than their private counterparts, but resource constraints and uneven governance practices undermine their ability to deliver retrofit projects at a larger (e.g. neighbourhood) scale. Homeowner-led efforts are particularly hampered by financial, technical, and informational barriers, with landlords often deferring retrofit responsibilities and tenants left without meaningful agency in the process. Our recommendations suggest that a model of cascading responsibility from government down to individuals may benefit from a more relational model of care, with an increased role to be found between NNGOs and social enterprises mediating between these stakeholders.

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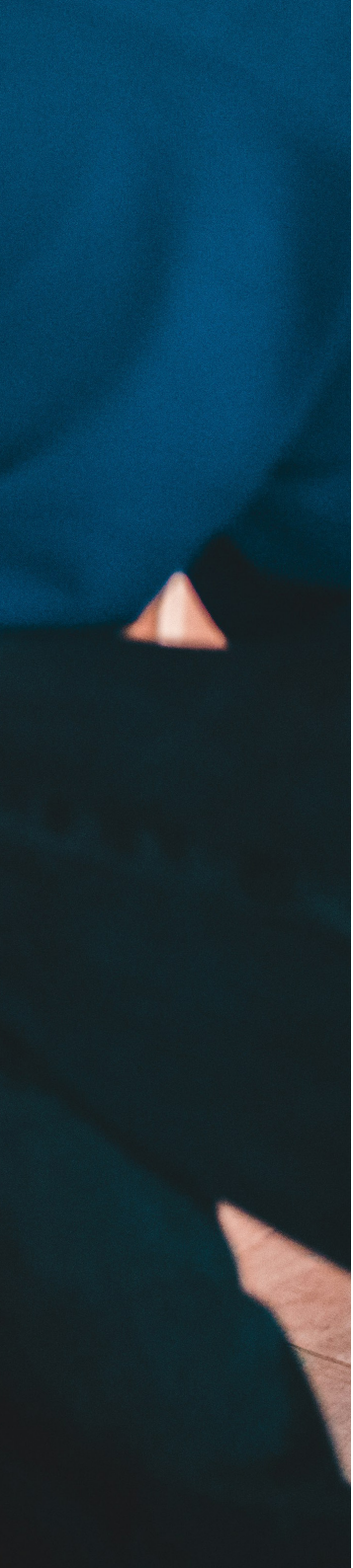

1. Introduction

Instances of energy-efficient retrofits in Scotland that have led to dampness, mould, health issues, and declining property values point to a troubling lack of care in how some upgrades are implemented (Casalis, 2025; Jones, 2024). This is particularly concerning given the urgent need to accelerate both the scale and quality of retrofit efforts for the UK to come close to meeting our climate targets. Domestic heating remains a significant source of greenhouse gas emissions, accounting for approximately 20% of the UK's total emissions (D. Brown, 2018). Achieving Scotland's legally binding climate commitments will, therefore, require substantial improvements in the energy performance of nearly all existing residential buildings.

Retrofitting typically involves the installation of (additional) insulation, upgraded ventilation and/or heating systems, and window replacements, all of which are widely recognised as crucial interventions for an energy-efficient home (D. Brown, 2018). Failures to show adequate care when undertaking these works can be not only devastating for affected households but also risk undermining public confidence in the vital transition towards a net-zero housing stock. A loss of public trust in retrofit

programmes could jeopardise Scotland's progress toward net-zero targets, particularly if such resistance leads to reduced uptake of energy improvement schemes.

Leading care scholar Joan Tronto defines 'care' as a broad political and ethical practice that involves everything we do to maintain, continue, and repair our world, so we can live in it as well as possible (Fisher & Tronto, 2003; Laurin & Martin, 2022; J. Tronto, 2013). This includes caring for ourselves, others, and our environment. She emphasises that care is not just a private or emotional act but a fundamental part of justice and democracy, requiring attentiveness, responsibility, competence, and responsiveness. While some scholarly work has begun to explore sustainability transitions through the lens of care (Damgaard et al., 2022), this area of study remains nascent. At the time of authorship, we could not identify research that has explicitly applied a care ethics framework to the specific challenges and processes of retrofit, let alone at multiple levels – from the Government to the household.

This insights paper bridges these bodies of research to address a central question: *how caring is Scotland's approach to energy retrofit?* To explore this, we apply Joan Tronto's ethics of care framework to four illustrative case studies representing different institutional levels involved in retrofit delivery: (1) the Scottish Government's retrofit strategy, (2) national non-state organisations (NNSOs), (3) neighbourhood-level institutions, and (4) private homeowner-led retrofit initiatives. Through this care lens, we seek to better understand not only the technical and policy aspects of retrofit but also how different aspects of care are enacted or neglected across the Scottish retrofit landscape.

To achieve our aims, this insights paper is structured as follows. Section 2 provides a review of relevant literature, outlining key developments in care scholarship and emphasising the significance of Joan Tronto's contributions. This section also explores how the concept of care has been applied to other real world challenges. In section 3, we present our analytical framework, which draws on Tronto's five elements of care. Section 4 outlines our methodology. Section 5 presents our findings, while section 6 offers a discussion of the key themes emerging from our analysis and identifies promising directions for future research. Finally, section 7 concludes the report by summarising our core insights and their implications for policy and practice.

2. Literature review

2.1 Care ethics

Care ethics originates from feminist theory within the fields of psychology (Fisher & Tronto, 2003), philosophy (J. Tronto, 2013), and political science (Sevenhuijsen, 2000). As a growing and relatively recent body of literature, it highlights the critical role of care work in society – formal and informal, paid and unpaid. Tronto defines care as 'everything we do to maintain, continue and repair our "world" so that we can live ... well' (J. Tronto, 2013), emphasising its fundamental role in sustaining both individuals and communities. Unlike conventional moral philosophies, care ethics foregrounds relational interdependencies and the lived experience of dependence, rather than autonomy or universal rules. Within energy discussions, care ethics – in particular the implications of relationality – offers an alternative to rights-based approaches such as energy justice that prioritise individual rights and political responsibility.

While all care ethics approaches are relational, not all relational approaches embody care ethics. Relational approaches in general understand energy systems as embedded in dynamic webs of social relationships in which economic, moral, and cultural values are constantly negotiated and co-constructed (Hargreaves & Middlemiss, 2020). Relational approaches have proven particularly insightful in analysing the micro-level processes that shape household decision-making (Bandelj, 2012), including choices related to energy consumption within communities (Bolton et al., 2023; Cairns, Southern, et al., 2024). However, while relational approaches help to reveal how social configurations influence decision-making (e.g. around retrofit), they do not provide normative guidance; that is, they do not evaluate whether particular social arrangements are 'good', 'just', or 'ethical'. In this respect, they stop short of addressing how social relations *ought* to be structured. Here, care ethics, particularly the frame-

work developed by Joan Tronto and others (Fisher & Tronto, 2003; Laurin & Martin, 2022; J. Tronto, 2013) offers a valuable normative complement to relational approaches.

It is important to note that care ethics, as articulated by Tronto, does not assume that all acts of care are inherently good. Indeed, Tronto explicitly rejects the notion that 'all care is good care'. For example, they highlight historic examples in which 'care can function discursively to obscure injustices', giving the example of imperialist agendas which were justified under the guise of providing 'care' while ultimately being exploitative forms of care washing (J. Tronto, 2013, p. 24).

Instead, Tronto and other care scholars (Fisher & Tronto, 2003; Laurin & Martin, 2022; J. Tronto, 2013) have developed a robust normative framework, which promotes a democratic and inclusive conception of care, structured around specific moral principles that are enacted through embodied social practices. This framework is outlined in Table 1.

Tronto presents her framework as a tool for identifying the various points at which care processes may be shaped (or disrupted) by conflict, power relations and inconsistencies (J. C. Tronto, 2019). She further contends that the kind of care process this framework seeks to encapsulate is more likely to approximate the ideal of ethical or effective care when it is holistic and integrated, with all elements functioning in alignment (ibid).

Table 1 — Five elements of care

Approach to care	Related principle	Description
Caring about	Attentiveness	Care begins with being observant and understanding peoples' needs, without which these needs may go unnoticed or be ignored.
Caring for	Responsibility	Caring for focuses on the obligation to respond to recognised needs. Merely acknowledging needs is insufficient; one must also take responsibility for addressing said needs, highlighting the importance of caregivers owning their role in providing support.
Care giving	Competence	Caregiving stresses the importance of providing care that is effective and meets the identified needs. Well-meaning but poorly executed care can lead to more harm. Hence, caregivers must ensure that they possess the skills and knowledge necessary to perform their duties effectively.
Care receiving	Responsiveness	Care emphasises the relational nature of care by encouraging caregivers to consider the perspectives and experiences of care receivers; hence, ensuring that care is not delivered in a top-down, impersonal manner but rather is respectful and tailored to individual needs.
Caring with	Solidarity, mutual trust, reciprocity	Caring addresses the broader context of fairness and equity, calling for a recognition of power dynamics and a commitment to providing justice-driven care while avoiding exploitation or bias.

2.2 The care framework as applied to real world issues

Tronto's five elements of care have contributed to a diverse body of work, termed 'care-full scholarship', analysing how care is enacted, institutionalised, and used to tackle real world issues. This body of work has informed democratic care practices in intellectual disability support (Simplican, 2018), nurse empowerment in decision-making processes (Laurin & Martin, 2022) and collective power-balanced teaching models in higher education (Bozalek et al., 2014). In social architecture, Tronto's care ethics have been applied to the needs of marginalised communities, showing how the role of architects can be expanded beyond traditional, professional boundaries (Cohen & Fenster, 2021). It is evident, therefore, that the framework has broad applicability across relational and institutional contexts.

More recently, the concept of care has gained attention in energy transitions, particularly as an alternative to dominant framings such as just transitions. While just transitions focus on fairness and equity in socio-technical change, they often prioritise economic and labour concerns over relational and ethical dimensions.

In response, Damgaard et al. (2022) propose an 'energy care ethics', which challenges prevailing individualistic frameworks in energy transitions. The authors highlight how individuals perceive energy systems through a lens of interdependence, necessity, and relationality, what the authors refer to as our "relational existence within energy webs" (Damgaard et al., 2022). These energy webs operate with a high degree of interconnectedness and relationships between various agents and stakeholders, from individual consumers up to national governments. Individuals' responses to the study reflect understanding of curtailments on their individual sphere of influence in relation to complex energy systems, particularly production, distribution and storage of energy, which are traditionally domains of work involving governments and multi-national corporations. Consumption, associated with individual behavioural practices, remains within agential control, but reveals a lack of engagement in addressing change and transition, leading to perceptions that most individuals simply do not care about collective action.

The authors argue that these perspectives are often overlooked in dominant discourses centred on individual responsibility and rational choice, through framing energy as an individual need and market driven, in opposition to energy

framed as a collective commons for all (Damgaard et al., 2022). By incorporating a theory of care, particularly highlighting challenges associated with relational engagements of "caring with" to support energy transitions, the authors advocate for an ethical approach that recognises relationality and interdependence as foundational to human existence and essential for ethical reasoning in everyday engagements with energy transitions. This approach calls for us to 'think energy with care' (Damgaard et al., 2022), emphasising the ethical significance of our connections within energy systems.

2.3 Research focus

In this insights paper, we expand the definition of energy practices to include retrofit within an overall just energy transition, whereby building stock itself is renovated, upgraded, and converted to increase energy efficiency, whether through increasing levels of insulation to increase heating/cooling retention, substituting technical components for higher efficiency, lower carbon ones (i.e., heat pumps for gas boilers), or considering improvements to air ventilation to reduce damp and mould and ensure good internal air quality. Retrofit, in this context, is the full sum of specialised adaptations of current building stock at a structural level to ensure energy transition improvements can be properly integrated, while striving to maintain the heritage of much of that built environment. We have not seen in published research an exploration of care ethics within the specific context of energy efficiency retrofit. To address this critical gap, our research examines care in energy retrofit as a case study within the broader sustainability transition agenda.

To create as complete an overview as possible of care in retrofit, we systematically analyse care through four different illustrative case studies:

- *The Scottish Government's retrofit strategy*
- *National non-state organisations*
- *Neighbourhood and community-level retrofit initiatives*
- *Private homeowner-led retrofit activities*

This study applies a care framework to Scotland's retrofit strategy to evaluate the extent to which it embodies principles of care and to identify areas requiring enhancement.

3. Analytical Framework

Tronto's conceptualisation of care is understood as a dynamic, processual phenomenon, marked by the interrelation of its constituent dimensions (Moriggi et al., 2020). However, for the purposes of this insights paper, the inherent interconnectedness of these dimensions presents certain analytical challenges, particularly in discerning how specific empirical phenomena correspond to individual components of the care framework.

To navigate this complexity, we adapted an analytical framework adapted from Moriggi et al. (2020) and J. Tronto (2013), designed for applicability across institutions operating at varying scales. This approach entails a systematic examination of practices in relation to each discrete dimension of care, aligning these with their corresponding ethical principles and associated forms of evidence. Such dual alignment offers a structured and rigorous means of operationalising Tronto's theory within empirical research.

Table 2 (below) provides an overview of the analytical framework applied in this study. It details the five core dimensions of care alongside the relevant evidence categories, illustrative examples of such evidence for institutions and organisations more broadly, and relevant retrofit-specific evidence.

Table 2 — Retrofit of care analytical framework (adapted from Moriggi et al.; 2020; Tronto, 2013)

Aspect of Care	Type of evidence
Caring about	Evidence of what case study actor(s) care about.
Caring for	Evidence of resources put in place and/or actions taken to address what is cared about.
Care giving	Evidence of effectiveness of the approach on the issues cared about (i.e. strengths and weaknesses of the approaches taken).
Care receiving	Evidence that perspectives of care receivers have been taken into consideration.
Caring with	Evidence that the actions undertaken by the actors responsible for the care have been shaped and informed reciprocally with the cared for.

	Example of evidence	Example of retrofit – specific evidence
	Stated organisational, initiative, or programme goals and goals implied (e.g. from empirical research or actions) relating to retrofit.	Recognition of the importance of retrofit and related issues.
	Human and financial resources deployed; services provided; actions taken.	Targeted funding for retrofit programs; outreach and advisory services.
	Evidence of how well objectives are realised; evaluation of performance.	Retrofit outcomes such as uptake of energy efficiency measures, improved thermal comfort, reduced energy bills, and increased satisfaction; audit and monitoring reports.
	Care receiver feedback (including of unintended consequences); bespoke approaches.	Post-retrofit user satisfaction surveys; adaptations based on tenant, homeowner, or organisational feedback; adjustments for unanticipated impacts (e.g. disruption or usability).
	Evidence of inclusive, deliberative decision-making processes, e.g. consultation and deliberative decision-making.	Community-led retrofit planning; co-design processes; inclusion of marginalised voices in policy and implementation discussions.

4. Methodology

4.1 Background

This research was conducted over a six-month period, from September 2024 to February 2025, by a team of eight researchers. The team comprised four experienced scholars with established expertise in sustainable energy retrofit enterprises, energy policy, and gender-environment interactions, who played a central role in shaping the overall research design and providing strategic guidance throughout the study. In addition, four early career researchers were each assigned responsibility for one of the four case studies, with tasks including data collection, analysis, and initial interpretation.

4.2 Research Design

4.2.1 Case Study Selection and Design

To explore the role of care ethics within the context of sustainable energy retrofit in Scotland, a case study methodology was employed, drawing on established methodological frameworks (Yin, 2012). Given the constraints of time and resources, the research adopted a broad-brush approach aimed at mapping the key contours of the field. Rather than engaging in in-depth empirical fieldwork, the objective was to provide a comprehensive overview that would capture the diversity of practices, discourses, and actors involved in the retrofit landscape. This approach aligns with exploratory case study designs, which are particularly suited to under-researched or emergent areas of inquiry where the aim is to generate insight and frame future research directions (Gerring, 2007; Simons, 2009). The study is therefore positioned as a scoping exercise that foregrounds conceptual and thematic analysis over granular empirical detail.

Four illustrative case studies were selected:

1. Scottish Government's retrofit strategy
2. National non-state organisations (NNSOs)
3. Neighbourhood-scale retrofit initiatives
4. Private homeowner-led retrofit activities

These cases are described in detail in the introductions to the case studies (sections 5.1 to 5.4).

The cases were purposefully selected using a combination of theoretical and pragmatic criteria. First, they reflect the interdisciplinary expertise of the research team, which includes scholars with backgrounds in energy policy, retrofit practice, and gender-environment interactions. Second, the selection aims to encompass a range of representative institutional levels, from national (Scottish Government and NNSO), through local (neighbourhood-scale retrofit initiatives), to the micro level of households. Third, each case is supported by a substantive body of literature, both academic and grey, ensuring the availability of contextual and documentary data to support empirical analysis (Bowen, 2009). Fourth, each case represents a critical context for examining how care ethics is embedded, contested, or operationalised in different retrofit contexts, ranging from formal policy frameworks to grassroot and individual initiatives.

4.2.2 Data collection

Across all four retrofitting domains, a qualitative document-based approach was adopted. The overall strategy was shaped by the need to access diverse types of evidence that could reveal both formal policy positions and everyday lived experiences. To this end, the study employed a combination of:

- **Targeted searches across multiple platforms,** including academic databases, government and parliamentary websites, organisational webpages, and grey literature sources such as media articles, consultation responses, and practitioner reports.
- **Search terms tailored to each domain,** typically incorporating key phrases such as 'retrofitting', 'energy efficiency', 'decarbonisation', and 'fuel pover-

ty'. In conducting these searches, we sought to identify elements aligned with the concept of care, while acknowledging that the organisations involved may not explicitly use terminology such as 'ethics of care'. Nevertheless, the term 'care ethics' was also included in combination with the primary search terms to ensure comprehensiveness.Iterative refinement of search criteria, beginning with Rapid Evidence Assessments (Speirs et al., 2015) and expanding to include non-academic and grey literature.

- **Iterative refinement of search criteria,** beginning with Rapid Evidence Assessments (Speirs et al., 2015) and expanding to include non-academic and grey literature.
- **Purposeful selection criteria,** prioritising documents that addressed care ethics explicitly or implicitly, demonstrated practical retrofit implementation, or included critique or evaluation of relevant policies and practices.
- **Structured documentation of source material,** with all findings logged systematically (e.g. in spreadsheets) to ensure consistency and transparency.

Beyond the academic literature, the nature and scope of data sources varies significantly across the different retrofit domains, reflecting their distinct institutional and practical contexts. The Scottish Government retrofit strategy case draws heavily on formal government and parliamentary documents to trace policy development, supplemented by media sources to capture contemporary public commentary, support, and critique. The NNSOs case necessitated the examination of NNSO websites, reports, and grey literature. The neighbourhood-led retrofitting case uses grey literature identified through Google searches using terms 'neighbourhood-level', 'retrofit', and 'Tronto's five elements of care'. For the private homeowner-led retrofit case, data collection included the review of documents from funding schemes and support organisations targeted at homeowners, such as the Home Energy Scotland Grant and Loan Scheme and Warmer Homes Scotland.

This multi-source, flexible approach enabled the collection of rich and varied data to interrogate how care is articulated and enacted across different retrofit contexts. This pragmatic adaptation aligns with methodological literature that supports combining systematic review techniques with qualitative analysis for complex social research (Forman & Damschroder, 2007).

4.3 Analysis

The analysis for this study was guided by a thematic analysis approach (Braun & Clarke, 2012), structured around Joan Tronto's five elements of care ethics (section 3). These five dimensions provided an analytical framework through which empirical data could be interpreted, enabling a structured and normative evaluation of how care is – or is not – embedded within retrofit practices in Scotland.

Data were coded deductively using Tronto's care dimensions, while remaining open to inductively identifying emergent themes within and across cases. This hybrid approach allowed the analysis to remain grounded in care ethics while being responsive to the empirical particularities of each case (Fereday & Muir-Cochrane, 2006).

To enhance the credibility and robustness of our findings, multiple forms of triangulation were employed:

- Investigator triangulation (Archibald, 2016) was achieved through the involvement of eight researchers in data collection and analysis. Each case study was led by one researcher, and the emerging findings were discussed as a team. This collaborative process allowed for the cross-checking of interpretations and mitigated individual researcher bias (Patton, 1999).
- Documentary triangulation was used to contextualise and validate findings. This included a broad range of sources: peer-reviewed scholarly literature, government and NNSO reports, policy documents, grey literature, and media coverage. Drawing on diverse document types helped ensure that the analysis reflected both institutional perspectives and public discourse (Bowen, 2009).

Together, these triangulation strategies contributed to a rigorous analytical process that not only examined how care was enacted across multiple institutional levels but also evaluated the ethical adequacy of those practices through a care ethics lens.

5. Findings

This section presents the findings from our four case studies: the Scottish Government's retrofit strategy; NNSOs; neighbourhood-level retrofit initiatives; and private homeowner-led retrofit activities (sections 5.1–5.4). It is followed by an analysis and summary of the findings, presented in section 5.5.

5.1 Scottish Government's retrofit strategy

This case was included as an example of state-led efforts to promote sustainable retrofit within a devolved governance context. The Scottish Government has positioned itself as a progressive actor on sustainability issues (OECD, 2023), yet has encountered significant implementation challenges.

In this case study, we focus on the Heat in Buildings Strategy (Scottish Government, 2021a), the key document outlining the Scottish Government's approach to retrofit. At the time of writing, the draft Heat in Buildings Bill, a proposed act of the Scottish Parliament that builds on the strategy, has been temporarily withdrawn due to concerns over its potential to exacerbate fuel poverty (Scottish Parliament, 2025). It is unclear what the implications of this will be. The case therefore provides a valuable opportunity to explore the tensions between policy ambitions for retrofit and ethical considerations such as fuel poverty alleviation.

The key actors in this case study are the Scottish Government, government agencies, and local government. The receivers of care in this case are principally residents of Scotland's housing stock, while other receivers of care may include institutions such as social and private landlords and building specialists.

5.1.1 Caring about

The 2021 Heat in Buildings Strategy combines ambitious environmental targets with strong social commitments.[1] Environmentally, the strategy is framed as a response to 'climate change' (mentioned 65 times) and sets interim goals of a 68% reduction in emissions from buildings by 2030 and 90% by 2040. It emphasises a 'fabric-first'[2] approach to energy efficiency (which is referenced 256 times) and promotes 'decarbonisation' (mentioned 84 times) through technologies such as heat pumps, heat networks, and electric systems.

Social justice is also a core concern. Fuel poverty is mentioned 135 times, with the strategy committing to its eradication and warning that climate policies must not worsen social inequality. The concept of a just transition (referenced 30 times) underpins the strategy's pledge to fairly share the costs and benefits of decarbonisation while supporting vulnerable communities and aligning with Scotland's well-being economy goals.

However, the strategy also acknowledges potential tensions between its climate and social goals, particularly due to the higher costs associated with zero-emissions heating systems. It explicitly notes 'the risk of tension between our climate change and fuel poverty targets' (Scottish Government, 2021a, p. 87). This conflict was further underscored by the 2025 withdrawal of the draft Heat in Buildings Bill, following concerns that the proposed measures might increase energy costs for those already experiencing poverty (Scottish Parliament, 2025).

5.1.2 Caring for

The Heat in Buildings Strategy shows a clear commitment to resourcing the transition to energy-efficient, low-emission buildings through financial, institutional, and human capital investment. Financially, the Scottish Government has pledged at least £1.8 billion over the current parliamentary term to support energy efficiency upgrades and the deployment of zero-emissions heating systems across domestic and non-domestic sectors (Scottish Government, 2021a,

1 At the time of writing, it is unclear whether this remains the underlying approach of the Scottish Government, following the withdrawal of the proposed Heat in Buildings Bill. However, no alternative strategic statement has yet superseded it.

2 'Fabric first' in energy efficiency retrofit means prioritising improvements to a building's envelope, such as insulation, windows, and airtightness, before adding technologies such as heating or renewables. This approach aims to reduce energy demand at the source.

p. 4). This funding is intended to drive large-scale improvements such as insulation and the installation of heat pumps and other clean technologies.

Institutionally, the strategy introduces a National Public Energy Agency, to be fully operational by September 2025, to lead on public engagement, delivery coordination, and information provision. Support structures such as Home Energy Scotland will continue offering advice and funding assistance. The strategy also commits to establishing a Green Heat Finance Taskforce to develop innovative mechanisms for attracting private investment (Scottish Government, 2021a, p. 4).

In terms of human capital, the strategy acknowledges the need for skilled workers and resilient supply chains, pledging investment in workforce training to create and sustain high-value local jobs (Scottish Government, 2021a, p. 4).

The strategy recognises that the £1.8 billion commitment is just part of the estimated £33 billion needed to fully decarbonise Scotland's building stock. It frames delivery as a shared responsibility, involving national and local government, the UK Government (for reserved powers such as energy markets and hydrogen), communities, industry, and regulators. Local authorities are tasked with area-based planning through Local Heat and Energy Efficiency Strategies (LHEES), while industry is expected to scale up supply chains.

5.1.3 Caregiving

In this section, it is not yet possible to provide evidence of how well the objectives are being realised. The strategy is forward-looking and has not yet been fully implemented, as the Bill is still not in place. As a result, the usual indicators of competence cannot be applied here and are instead replaced with commentary drawn from the public domain. Readers will note, therefore, that this creates some overlap with the following section on feedback from care recipients.

In broad terms, the Scottish Government's approach to retrofit has received considerable support from key stakeholders. The Scottish Federation of Housing Associations (SFHA) and the Existing Homes Alliance welcomed its focus on a just transition and funding for social housing (Scottish Housing News, 2021). Industry bodies such as the UK Green Building Council and a coalition including Scottish Renewables and the Heat Pump Federation praised its ambition, investment commitments, and potential to stimulate jobs and supply chains

(Scottish Housing News, 2025). SP Energy Networks also endorsed the strategy's collaborative approach and its emphasis on network readiness (SP Energy Networks, 2021). Overall, supporters recognise the strategy as a crucial step toward decarbonising Scotland's buildings while protecting vulnerable groups.

Nonetheless, the Scottish Government itself is sceptical about the competence of key actors essential to the effective implementation of the strategy. The Heat in Buildings Strategy acknowledges both the limitations of the Scottish Government's devolved powers, particularly in areas such as the regulation of electricity and gas markets and energy network infrastructure that remain reserved to Westminster, and concerns about the clarity and consistency of current commitments to decarbonisation. Furthermore, researchers cast doubt about whether local authorities are sufficiently resourced to deliver local retrofit programmes (Sugar et al., 2024; Wade et al., 2022).

Moreover, the Heat in Buildings Strategy has faced criticism from a range of institutional actors and stakeholders. Audit Scotland raised concerns in its 2024 report of significant delivery risks, highlighting delays in establishing delivery teams and the lack of a clear action plan from the Scottish Government (Seidel et al., 2024). The Climate Change Committee (CCC), the UK's official advisory body on climate, stated that Scotland's legally binding 75% emissions reduction target by 2030 was 'no longer credible', attributing this in part to slow progress in the buildings sector (CCC, 2024).

The SFHA criticised the strategy for failing to provide sufficient funding for social landlords, warning that this could lead to higher rents and worsening fuel poverty (Findlay, 2025). Meanwhile, Propertymark, which represents property professionals, called out a lack of clarity and support for private landlords in achieving energy efficiency standards (McIntosh, 2025).

Following the Scottish Government's withdrawal of the draft Heat in Buildings Bill in 2025, political opponents, including Scottish Green MSPs, argued this move undermined climate commitments and risked delaying urgent decarbonisation (Findlay, 2025). Research Fellow in Fuel Poverty and Energy Policy, Keith Baker, specifically criticised the Scottish Government's competence in designing the policy, stating that what comes next must be *'helmed by competent MSPs and competent civil servants'* (Baker, 2025).

Anti-poverty charity Oxfam suggested not enough money was in place to address fuel poverty. These concerns were echoed at the ministerial level (Kaur

Grewal, 2025). In 2025, Acting Cabinet Secretary Gillian Martin MSP acknowledged in the Scottish Parliament that the draft Heat in Buildings Bill would not proceed in its current form because it had failed to balance decarbonisation with protecting vulnerable households. In her words: *'I do not feel that the previous drafting that was done took that* [impacts on fuel poverty] *into consideration significantly'* (Scottish Parliament, 2025).

5.1.4 Care receiving

The strategy acknowledges that effective policy implementation requires tailored approaches, particularly in response to the unique challenges posed by heritage buildings, local contexts, and households experiencing fuel poverty; as the strategy notes, 'the transition… may look different in different communities and require approaches tailored to place' (Scottish Government, 2021a, p. 43). The Scottish Government has also attempted to tailor its approach in recognition of issues of fuel poverty, evidenced by the publication of a dedicated strategy for tackling fuel poverty in Scotland that outlines a targeted approach to supporting vulnerable households through the transition to net zero (Scottish Government, 2021b). However, given the reaction of Oxfam and the Scottish Government's justification for withdrawing the proposed Heat In Building Bill (see section 5.1.3), this tailored approach is currently considered insufficient.

In terms of feedback, the previous section indicates a mixed reaction from institutional care recipients such as landlords. In terms of residents, over 1,600 responses were submitted to the consultation on the Heat in Buildings Bill, with 1,311 respondents consenting to publication, many of whom are homeowners or other residents of Scotland's building stock. While a full analysis of these submissions is beyond the scope of this report – and the Scottish Government has not yet published its official summary — a random sample of the published responses suggests a mixed reaction. A recurring theme in critical submissions relates to concerns about affordability and the fairness of the proposals, particularly their potential impact on those already experiencing fuel poverty. For example, respondents write: 'The proposals are too expensive and the targets are unrealistic. There are more pressing problems for the government to deal with'; 'It is the government which is insisting on the changes to existing buildings and therefore the government should pay for the proposal through general taxation or 100% subsidies'; and 'tackle big business before you destroy people's lives by hounding them out of their homes' (Scottish Government, 2024a).

5.1.5 Caring with

There is evidence that the Scottish Government's Heat in Buildings Strategy was shaped through reciprocal engagement with stakeholders. The strategy explicitly states that it was developed through consultation with 178 individuals and organisations and drew on the findings of two major participatory initiatives: Scotland's Climate Assembly, a citizen deliberation body comprising randomly selected members of the public tasked with developing climate recommendations; and the Zero Emissions Social Housing Taskforce (ZEST), a group of housing experts convened to advise on decarbonising social housing in a way that supports affordability and social justice. These bodies provided valuable insight into how climate policy could be both effective and equitable.

However, there is also compelling reason to question the depth and authenticity of this reciprocal process. Academic research has more broadly criticised Scottish Government consultations as often lacking genuine deliberative power: Morison (2017) argues that public consultations are frequently symbolic rather than substantive. Others describe the view that Scottish policymaking is highly consultative and participatory as largely a 'mythology' rather than reality (Beck, 2024).

Scotland's Climate Assembly itself expressed disappointment with the government's response to its recommendations. Andrews (2022) in *Frontiers in Climate* notes that Assembly members felt their proposals were only partially implemented and that key concerns – such as the risk of fuel poverty from decarbonisation policies – were insufficiently addressed. The Assembly explicitly warned that aspects of the retrofit strategy could '*push more people into fuel poverty*' (Scotland's Climate Assembly, 2022). Further criticism has emerged around the consultation process for the withdrawn bill, with some experts claiming that the government had disregarded sectoral advice and technical recommendations in developing the proposed text (Baker, 2025).

5.2 National non-state organisations

In this research, National Non-Government Organisations (NNSOs) are defined as non-state actors in Scotland that contribute to housing, retrofitting, energy efficiency, and climate adaptation through research, advocacy, training, standard-setting, and professional practice. They include both non-profit organisations (e.g. professional associations, networks, advisory bodies) and commercial enterprises (e.g. construction firms, architectural practices, energy providers). Such organisations play a pivotal role in shaping public discourse, influencing policy, disseminating knowledge, and supporting implementation of public policy driven by government strategies (Gillich, 2013; Kerr & Winskel, 2018; Owen et al., 2014). Operating as intermediaries between the top-down governance structures (e.g., governments, policymakers) and the grassroots level (e.g., households, end-users), these organisations work on enabling systems and institutional capacity and influencing retrofit decision and activity of end users.

By examining the wide ranges of NNSOs, this research captures how care practices and ethics are enacted beyond formal government structures and considers the role of civil society in mediating between top-down and bottom-up retrofit efforts. This breadth also illustrates the complex landscape of retrofit beyond government strategy and helps identify where care in retrofit is less visible or insufficiently supported. NNSOs involved in retrofit can be grouped into six key types by their focus:

a) industry skills development
b) policy research and knowledge exchange
c) energy and environmental knowledge sharing
d) professional standards
e) construction and energy service delivery
f) consultancy based services.

While the NNSOs often do not limit their target group, the range of beneficiaries can be distinguished by the categories identified, as listed in Table 3. Most of the listed categories such as from the ‘industry skills development’ and the ‘policy research and knowledge exchange’ involve more with organisations, such as supply chain actors, local authorities, and government agencies and research institutions. While ‘energy and environmental knowledge sharing’ and ‘consultancy-based practices’ groups are commonly involved with individual households.

5.2.1 Caring about

The organisations studied share a unifying goal of driving Scotland's transition toward a low-carbon, climate-resilient future, with a particular focus on the built environment. Examples of the aims of the organisations studied include: 'to accelerate the built environment's transition to zero carbon emissions' (BE-ST, 2025); 'to transform Scotland's existing homes' (ExHA, 2025); 'to support community-led action in Scotland to address the climate and nature emergency and work for a just, thriving and resilient Scotland' (SCCAN, 2025); 'to reduce the impact of carbon emissions from household energy consumption and highlight the wider social and economic benefits of retrofitting existing housing' (Low Carbon Homes, 2025); and 'to decarbonise Scotland's homes' (Changeworks, 2025).

Overall, the organisations' objectives cover the overarching carbon emissions target and its social aspects, which are aligned with many of the Heat in Building Strategy's key objectives (section 5.1.1).

5.2.2 Caring for

As illustrated in Table 3, NNSOs across the sector show seven key areas of responsibility, either explicitly stated or demonstrated through practice. These are thematised below:

- **Theme 1: Knowledge Exchange and Research Production:** Organisations contribute to the evidence base by generating research and facilitating knowledge sharing.
- **Theme 2: Stakeholder Connectivity:** They foster diverse collaborations and networks, bridging gaps across policy, industry, and practice.
- **Theme 3: Access to Knowledge and Resources:** Many act as intermediaries between national governments and local communities, neighbourhoods and end-users, offering access to information, tools, and inspiration to support retrofit efforts.

- **Theme 4: Training and Facilitation:** Some provide structured training programmes and facilitate skills development for the retrofit workforce
- **Theme 5: Awareness and Innovation Promotion:** These actors play a role in public engagement, raising awareness and showcasing innovative approaches and technologies.
- **Theme 6: Policy and Funding Influence:** Certain organisations actively engage in shaping policy and funding mechanisms through advocacy and advisory roles.
- **Theme 7: Consultancy Services:** Others operate as expert consultants, facilitating translation of government policy and strategy into application for sustainable homes, retrofit design, and heritage or conservation considerations.

Table 3 — Responsibilities of key Scottish retrofit actors[3]

Categories	**Contributors** (cases)
Industry-focused, skills development organisations	Built Environment - Smarter Transformation (BE-ST)
Policy-focused, research & knowledge exchange organisations	UK Collaborative Centre for Housing Evidence Existing Homes Alliance SFHA
Energy and environmental knowledge & skill-sharing organisations	Scottish Ecological Design Association (SEDA) Scottish Communities Climate Action Network (SCCAN) Low Carbon Homes Energy Saving Trust Changeworks Citizens Advice Scotland UnderOneRoof

3 Data sourced from the organisational websites.

Responsibilities (Theme, T)

- Knowledge exchange, work with key stakeholders to support the transition to zero carbon (T1)
- Connect stakeholders through diverse collaborations to solve challenges in retrofitting construction sector to zero carbon targets (T2)
- Provide access to knowledge, resources, including through Retrofit Scotland Knowledge Hub (T3)
- Provide training through Retrofit Training and access to resources to the public and/or practitioners (T4)

- Provide research and knowledge exchange on housing related to climate resilience & adaptation, retrofitting to net zero, fuel poverty (T1)
- Facilitate engagement among policymakers, practitioners, researchers, and the public (T2)
- Raise awareness of retrofit among the public and policymakers, promote innovations (T5)
- Contribute to shaping policy and funding frameworks (T6)

- Provide access to knowledge, resources; climate and nature emergency, reducing the impact of carbon emissions from households(T3)
- Provide training, resources, and facilitation (T4)
- Connect stakeholders, creating networks of community actions (T2)
- Knowledge exchange through stories and best practices on end-users approach to retrofit and energy efficiency (T1)
- Raise awareness of the climate emergency (T5)

Table 3 — cont.

Categories	**Contributors** (cases)
Professional body & industry standards organisations	Chartered Institute of Building (CIOB) Chartered Institute of Housing (CIH)
Providers of construction and energy	Procast Group
Consultancy practices	John Gilbert Architects Mast Architects Hypostyle Architects

Some NNSOs deliver services and products related to construction, energy systems, and consultancy. It is important to note that these are a type of organisation distinct from small and medium enterprises (SMEs) that deliver retrofit on the ground, which are discussed in later sections. The organisations considered in this case operate at the national level. Some of the NNSOs are for-profit companies, such as architects. Others are social enterprises, such as companies limited by guarantee like Built Environment - Smarter Transformation (BE-ST), which works closely with industry partners. NNSOs tend to define their responsibility in terms of shaping skills, fostering innovation, and generating impact through the development of new products and services within the retrofit sector.

Responsibilities (Theme, T)

- Provide access to knowledge, best practices, resources; housing & professional standards (T3)
- Provide a platform for housing professionals to connect (T2)
- Research to address the built environment challenges (T1)
- Advocate for high standards in public policy (T6)

- Provide business and knowledge sharing; project with installed energy technology (T3)
- Provide access to information on energy technology (T3)

- Provide consultancy on sustainable architecture, retrofit, and conservation, with in-house conservation experts (T7)

Some NNSOs provide energy and environmental knowledge sharing, including Changeworks (2024) and the Energy Saving Trust (2025). Not only do these NNSOs provide public-facing resources on carbon reduction, energy security, and climate action, but they also collaborate operationally. Together, they form Warmworks, a managing agent responsible for overseeing the installation of heating, energy efficiency, and insulation measures in homes (Warmworks, 2025).

Some organisations are directly shaped by government funding or co-funding, which influences their responsibilities. For instance, Energy Saving Trust delivers the Scottish Government's Warmer Homes programme, targeting households at risk of fuel poverty. In such cases, responsibilities are tightly aligned with public policy aims.

5.2.3 Caregiving

There is currently a notable lack of systematic evaluation of the competence or overall performance of key NNSOs engaged in retrofit efforts in Scotland. While empirical evidence remains limited, emerging research provides insights into both the potential benefits these organisations offer and the challenges they face in meeting their objectives.

NNSOs involved in retrofit (either in Scotland or elsewhere) are widely acknowledged for their important role in coordinating stakeholders, influencing policy, and advocating for retrofit initiatives (Hofman et al., 2021; Janda et al., 2019). These actors contribute to shaping the retrofit landscape by acting as intermediaries between government, industry, and local delivery agents. However, their effectiveness is frequently constrained by a range of structural and operational limitations.

One major constraint is the fragmentation of data collection and the inconsistency of knowledge-sharing practices, which undermine coherent planning and strategic alignment (Boselli, 2024). In addition, the sector suffers from a shortage of technical skills which limits the capacity of NNSOs to implement or support retrofit programmes at scale (Built Environment Forum Scotland et al., 2023). Partnerships between these organisations and local authorities or delivery partners are also frequently challenged by misaligned priorities, ambiguous roles, and mismatched expectations (Bal et al., 2013; Wade et al., 2020). For-profit private sector organisations may encounter trust deficits when engaging with the public and other stakeholders (Cairns, Hannon, et al., 2024). Meanwhile, not-for-profit organisations that rely on short-term funding suffer shortages of paid and volunteer staff (Donnellan, 2022), leading to inconsistent levels of engagement and capacity to operate (Just Transition Commission, 2023).

Despite supporting or delivering training initiatives aimed at upskilling the retrofit workforce, many of these organisations still struggle to bridge the skills gap among those delivering retrofit on the ground, which remains a significant barrier to meeting national retrofit targets(Hillsdon, 2024). Furthermore, while their strategic influence is recognised, NNSOs often fail to provide practical, actionable guidance for those delivering retrofit measures at the household level. Information on appropriate retrofit technologies for different building types, how to avoid unintended consequences, cost implications, and project management strategies is often limited or inaccessible (Alabid et al., 2022). A

fundamental issue lies in the institutional positioning of these actors: many operate outside of direct government structures as third-sector or private entities, which can lead to coordination failures and a lack of alignment with overarching government strategies such as the Heat in Buildings Strategy. These 'middle actors', though vital, are often poorly integrated into formal policy implementation frameworks, weakening their overall impact (Gillich, 2013; Kerr & Winskel, 2018; Owen et al., 2014).

5.2.4 Care receiving

There is currently a lack of data on the unintended consequences of retrofit NNSOs in Scotland and from end users providing feedback or detailing specific outcomes of their engagement with NNSOs.

5.2.5 Caring with

Organisations that adopt a caring approach by connecting stakeholders through diverse collaborations, aligned with Theme 2, are well positioned to cultivate Tronto's *'caring with'* as an ethic of care. By fostering engagement among various stakeholders through events, these organisations can establish themselves as trusted intermediaries for information, training, and knowledge sharing. The work of Wade et al. (2020) identifies a similar ethic of care within non-state organisations.

However, an organisation's reciprocity with the cared may depending on whether it is membership-based or non-membership-based and for the public's benefit. For example, BE-ST, an industry-focused, non-membership organisation, actively engages the public through retrofit conferences and skill-training events, attracting diverse participants. The 2023 BE-ST International Retrofit Conference welcomed over 300 participants and exhibitors (BE-ST, 2023) In contrast, some membership-based organisations charge fees for public retrofit events, which may be unaffordable for many would-be participants, potentially limiting participation.

5.3 Neighbourhood-level retrofit initiatives

This scale was included to investigate how care is expressed through collective action, collaboration, and community organising. It enables a focus on relational dynamics, including how local organisations and residents negotiate trust, knowledge sharing, and responsibilities in pursuit of retrofit goals (Putnam & Brown, 2021; Seyfang & Haxeltine, 2012).

Retrofit implementation often materialises at the community or neighbourhood level, where actors are embedded in local social, material, and institutional networks.

Key institutions at this scale include social sector organisations such as community enterprises, development trusts, housing associations, and various grassroots groups (Putnam & Brown, 2021). While private traders may also play a role at this level, for the purposes of this study, we considered that their role more significant at the level of private homeowner-led retrofit, so local contractors are discussed in section 5.4.

In the case of neighbourhood-level institutions, the recipients of care are principally local residents.

5.3.1 Caring about

Third-sector organisations (such as community energy groups) typically have a broader set of goals than private sector organisations, being driven by social and environmental commitments (Sansom & Hall, 2025). Although climate change mitigation is often central to their mission (Atkinson, 2018), another core motivation for these organisations is the desire to address pressing social needs, including alleviating fuel poverty, supporting vulnerable households, and improving the quality of housing (Simpson et al., 2021). While registered social landlords (RSLs) have a duty to build, improve, or manage housing (including energy efficiency improvements), they often have wider objectives such as promoting affordable housing, community regeneration and well-being (Flint & Kearns, 2006; Power, 2025).

5.3.2 Caring for

Social sector organisations' efforts are typically rooted in community engagement, aiming to ensure that the benefits of energy transition are equitably distributed at the local level (Atkinson, 2018; Putnam & Brown, 2021). Third-sector organisations' embeddedness in local contexts works to build trust and leverage their deep knowledge of community needs, which enhances their credibility and effectiveness in delivering retrofit projects (Sansom & Hall, 2025). Furthermore, these organisations frequently operate in collaborative networks, forming partnerships with local authorities, private enterprises, and other stakeholders to design and implement retrofit schemes that are inclusive, impactful, and contextually appropriate (Wade et al., 2020). Similarly, successful leaders of residents' and owners' associations advocate for inclusive decision-making processes that allow local voices to shape retrofit strategies (Hofman et al., 2021). Social housing organisations have dedicated considerable resources to energy efficiency upgrades of their stock, with many having separate retrofit budgets (Palmer et al., 2018). Interestingly, social housing was not included in the Scottish Government's draft Heat and Building Bill because of the recognition that RSLs 'have already been working to decarbonise their homes' (Scottish Parliament, 2021).

5.3.3 Caregiving

Proximity within neighbourhoods facilitates knowledge sharing and mobilisation. Local awareness of retrofitting often arises through peer interactions and shared concerns over rising energy costs and climate change (Putnam & Brown, 2021). Community mobilisers play critical roles in fostering participation, benefiting from their physical and social proximity to residents (van Casteren et al., 2024). Local actors may possess deep contextual knowledge, enabling more targeted and accepted interventions (Karvonen, 2018).

Social sector actors in particular bring a variety of competencies. Community-led initiatives often employ cooperative governance structures that promote inclusivity (Potts & Ford, 2022; Stewart et al., 2023). These models empower residents, support shared decision-making, and ensure that the benefits of clean energy – such as financial surpluses – are distributed locally (Bray & Ford, 2022). Successful partnerships between social and private sectors have also emerged, such as Loco Home Retrofit in Glasgow, a multi-stakeholder co-operative uniting tradespeople and residents to coordinate neighbourhood

decarbonisation (Loco Home Retrofit, 2024). The social sector plays a vital role in supporting disadvantaged populations. Social housing associations provide direct energy advice and implement efficiency upgrades for vulnerable residents, especially in ageing tenement buildings (Cairns, Southern, et al., 2024; Johnston et al., 2024). Homes in the socially rented sector are already some of the most energy efficient – compelling evidence of the role of social housing in retrofit (Scottish Government, 2025).

Despite these strengths, several limitations persist. A shortage of skilled tradespeople undermines installation quality and erodes trust in local retrofit services (Ascione et al., 2021; Hargreaves & Middlemiss, 2020). Community-led initiatives may struggle with governance challenges, including imbalanced decision-making processes and insufficient inclusion of marginalised groups (Excell et al., 2024; Stewart et al., 2023). The community sector frequently faces resource constraints, limiting its capacity to deliver projects at a scale larger than the individual households (e.g. communitywide district heating systems), access finance (Potts & Ford, 2022; Stewart et al., 2023). However, RSLs have had some success in accessing funds, attracting finance, and undertaking larger projects (Scottish Government, 2025) due to dedicated government funding, long-term planning capabilities, and streamlined procurement processes (Palmer et al., 2018).

5.3.4 Care receiving

Little evidence exists detailing the perspectives of recipients of purely neighbourhood-level retrofit organisations, especially in comparison with other organisational scales of retrofit action. There is also little evidence which details feedback on the care received from social enterprises in the renovation or retrofit sectors. However, it is recognised that social enterprises retain high levels of trust with customers (Lin et al., 2021; Szabolcs, 2024). There is mixed evidence of RSLs, with examples of good practices in which they tailor retrofit building renovations needs (Furman & Hadjri, 2025), as well as situations in which many residents feel that their perspectives were not taken into consideration in the retrofit process (Charles et al., 2025; Furman & Hadjri, 2025).

5.3.5 Caring with

Collaborative decision-making processes are hardwired into the organisational forms of many social sector actors (Smith & Teasdale, 2012). Examples such as the Glasgow Community Energy co-operative and Loco Home Retrofit provide concrete evidence of participatory approaches involving multiple stakeholders including homeowners, local government, and private traders (Bray & Ford, 2022; Loco Home Retrofit, 2024). However, much of the available evidence for these models is produced by the organisations themselves and lacks independent, systematic evaluation. There is some emerging evidence which points to variation in the participatory processes of social housing associations.

5.4 Private homeowner-led retrofit activities

This case allows for the examination of care as it relates to domestic life (e.g. everyday practices and intra-household decision-making), foregrounding issues often overlooked in policy discourse (Devine-Wright, 2007; Meier & Rehdanz, 2010) as well as dynamics between private landlords and tenants or between co-owners of multi-owned properties (e.g. apartment blocks, tenements, etc.). Note that RSLs are not considered at this level with the understanding they are more suitably considered at the neighbourhood scale.

The givers of care in the case of private homeowner-led retrofit initiatives are:

a) households;

b) private landlords (typically small scale);

c) groups of owners/neighbours (particularly when properties are co-owned) and;

d) local tradespeople and SMEs contracted by householders to undertake work.

Private homeowner-led retrofitting refers to retrofit activities initiated and directed by individual homeowners, reflecting their personal agency and decision-making autonomy. This encompasses cases in which homeowners both initiate and carry out the retrofit work themselves, commonly referred to as 'do-it-yourself' (DIY) retrofitting (Bobrova et al., 2021; Haines & Mitchell, 2014). It also includes situations in which homeowners assume a managerial role by subcontracting tradespeople to perform some or all of the retrofit interventions.

5.4.1 Caring about

A resident's occupancy status highly influences their motivations for and attitudes towards retrofitting their home. Homeowners typically prioritise their housing quality and personal comfort, commonly addressing issues such as dampness and mould that directly affect their health and can also impact property value (Bobrova et al., 2021; Wang et al., 2022). Additionally, climate awareness can prompt some owners to undertake energy-efficient measures, but

this is often linked to the dual benefit of enhancing property value (Bobrova et al., 2021). Individual economic circumstances also influence how homeowners perceive the need to retrofit. Low-income households typically experience a greater urgency to retrofit, owing to the higher relative financial burdens related to energy inefficiencies in their homes. Conversely, higher-income homeowners may deprioritise energy efficiency measures as the financial impact of inefficiency is less pressing, underscoring that attentiveness to retrofit is closely linked to personal experiences of energy-related hardship.

Landlords, on the other hand, often primarily base their retrofit decisions on financial returns and regulatory compliance, demonstrating a conditional form of caring; Landlords typically lack a care-centred motivation for energy efficiency, often deferring retrofit responsibilities, demonstrating a compliance-driven approach (Hope & Booth, 2014). Also, investment tends to be lower in high-demand rental markets, as properties remain profitable even without energy improvements (Adan & Fuerst, 2015; Cellini, 2021). Landlords are also more reactive than proactive, waiting for tenants to request interventions rather than initiating retrofit in a preventative manner (Cairns, Southern, et al., 2024; Cellini, 2021).

5.4.2 Caring for

Despite Government incentive schemes, financial barriers remain the most commonly cited barrier to homeowners undertaking retrofits, and high upfront costs and extended payback periods consistently deter investments (Howarth & Roberts, 2018; Panakaduwa et al., 2024). Homeowners frequently prioritise investing in cosmetic improvements rather than energy efficiency measures. This preference indicates a willingness to invest in their homes, although not always toward improving the home's energy performance. Additionally, they are also often wary of retrofitting due to its associated disruptions, commonly referred to as the 'hassle-factor' (Howarth & Roberts, 2018).

For those who pursue retrofit, their motives are often linked to emotional and aesthetic values. As Haines & Mitchell (2014) evidence, these homeowners view retrofitting as part of a broader duty to care for and maintain their homes. For them, retrofit is seen as a necessary investment that aligns with an ethos of owner-stewardship, home-based pride, and sentimental attachment and as

part of ongoing property improvement (Bobrova et al., 2021). Hence, framing retrofits around comfort and well-being improvements, as well as lifestyle aspirations, has been shown to positively influence uptake and even long term retrofit success (Haines & Mitchell, 2014; Wang et al., 2022).

For landlords, retrofit engagement tends to be driven by financial returns and property value enhancements, particularly in lower-demand rental markets, where energy efficiency improvements can distinguish their properties and increase asset competitiveness (Fuerst, 2015; Cellini, 2021). At the same time, landlords often under-utilise the potential role of tenants in advancing energy efficiency. As Cellini (2021) observes, lease agreements typically prohibit tenants from making alterations to the property, including energy-saving modifications.

5.4.3 Caregiving

The comparatively lower energy efficiency of owner-occupied and privately rented homes, relative to socially rented properties, serves as an indicator of limited retrofit competence across these tenures (Scottish Government, 2024b). Given the documented lack of both motivation to care about and practical engagement in caring for retrofit among private landlords, it is unsurprising that their properties are among the least well retrofitted.

A central challenge to retrofit uptake is the lack of financial competence among property owners surrounding retrofit's cost benefits, particularly in evaluating long-term savings. Wang et al. (2022) found that a major barrier to retrofit adoption is the difficulty homeowners face in accurately predicting cost savings and return on investment. This contributes to homeowners' hesitation and uncertainty, which often leads to inaction (Howarth & Roberts, 2018; Panakaduwa et al., 2024). Additionally, the fragmented nature of government support, characterised by inconsistent and confusing information, makes the difficulty in accessing suitable assistance a major deterrent to retrofit (Bucke et al., 2023).

Moreover, homeowners often lack the necessary technical expertise to understand and implement appropriate retrofits, meaning they are often left uncertain about the correct strategy for their specific property. Haines & Mitchell (2014) found that homeowners frequently remain uncertain about appropriate retrofit strategies and are often hesitant to act, particularly when faced with the unique characteristics of their individual homes. Even those individuals with relevant professional backgrounds frequently report unsatisfactory or unexpected outcomes to retrofit projects (Wang et al., 2022).

Homeowners often have difficulty identifying skilled contractors who they perceive they can trust, sometimes due to a disconnect in technical knowledge. This often results in miscommunication and sometimes poor-quality work, which in turn deters homeowners from considering retrofit projects (Bucke et al., 2023). On the other hand, DIY retrofit efforts tend to only remain feasible for homeowners with substantial technical know-how, available time, and significant financial resources (Haines & Mitchell, 2014). Without these capabilities, most homeowners are unable to carry out effective retrofit projects independently.

For landlords and tenants, caregiving is complicated by inherent conflicts of interest, namely the 'split incentive' issue: landlords typically prioritise regulatory compliance and financial returns whereas tenants prioritise comfort, safety, and saving money on energy bills. As passive recipients of retrofits, tenants frequently experience imposed changes in the home, often without inclusive consultations, and must grapple with fears of potential rent increases and displacement. The lack of effective mechanisms for reciprocity and shared decision-making between these parties with split incentives fosters distrust and undermines the potential for meaningful engagement, while also perpetuating energy inefficiency in rental housing and limiting tenant agency (Cellini, 2021; Hope & Booth, 2014).

5.4.4 Care receiving

Owner-occupiers are typically the primary beneficiaries of their own retrofit investments, positioning them also as major recipients of care. This personal investment often encourages a heightened engagement and confidence in their decision-making regarding their own needs and preferences (Haines & Mitchell, 2014). Furthermore, a sense of pride in the progress of and completion of a project is driven by this owner autonomy and hence positively influences their perceptions of retrofit outcomes, mediating disappointments and fostering continued commitment, despite these sometimes being suboptimal (Bobrova et al., 2021).

However, external actors, such as contractors, can introduce knowledge asymmetries (Janda et al., 2019; Owen et al., 2014). When expertise is unevenly distributed, contractors may exert significant influence over the direction of retrofit projects, sometimes discouraging owners from pursuing energy efficiency

measures in favour of more conventional or marketable upgrades (Bolton et al., 2023).

This can reconfigure the decision-making process away from the homeowner, reducing their direct control and potentially diminishing the quality and ambition of retrofit outcomes (Bolton et al., 2023). Relatedly, it is well documented that homeowners inside and outwith Scotland often report a poor quality of care from local tradespeople operating in the sector (Clements, 2025; Gupta & Chandiwala, 2010; Hargreaves & Middlemiss, 2020; May et al., 2012; Novikova et al., 2011; Snape et al., 2015). As retrofit is a male dominated industry, women homeowners may suffer from gender discrimination by traders (Bolton et al., 2023b).

Additionally, it is also important to recognise that experiences of retrofit are not homogeneous across all owner-occupiers. Individual household experiences of retrofit are diverse and influenced by intra-household dynamics, including gender roles and differences in biological sex. For instance, women may engage differently with retrofit decisions, execution, and outcomes, as their perceptions of what is needed within a household retrofit are sometimes informed by differing experiences of the home, reflecting broader patterns of care responsibilities within households (Sunikka-Blank et al., 2018).

5.4.5 Caring with

In decision-making processes regarding housing matters and in particular retrofit, individual homeowners rarely operate as fully autonomous agents. Rather, their choices and agencies are embedded within a complex web of institutional, financial, and interpersonal relationships. Government agencies play a significant role by offering financial support mechanisms and regulatory guidance, which influence homeowners' options and behaviours (Chen et al., 2023; Panakaduwa et al., 2024). Similarly, banks and financial institutions mediate access to capital through mortgages and loans, thereby shaping the feasibility of particular decisions (D. Brown et al., 2019). In addition to formal institutions, homeowners typically depend on informal networks such as friends, family, and neighbours for advice, reassurance, and practical support (Davis et al., 2025; Hargreaves & Middlemiss, 2020).

Unfortunately, these interpersonal relationships are often characterised by asymmetries. Interactions with institutional actors, such as government bodies

and banks, are frequently marked by imbalances in knowledge and authority that can limit the agency of homeowners (Hargreaves & Middlemiss, 2020). In contrast, relationships with peers, such as friends, family, and neighbours, tend to be more equal and trusting. Nevertheless, these networks often lack the technical expertise necessary for specialised decision-making, such as understanding energy efficiency retrofits or navigating planning regulations (Devine-Wright, 2007).

Asymmetries in the interactions between homeowners and the contractors who carry out their construction work are also significant in shaping the nature and extent of retrofit. These relationships are frequently characterised by power imbalances arising from pronounced information asymmetries, particularly in relation to pricing mechanisms and technical expertise (Janda et al., 2019; Owen et al., 2014). Such disparities can substantially shape decisions regarding the feasibility of renovation projects and necessitate adjustments to align with clients' financial constraints (Brown & Vergragt, 2008). Typically, clients are at a disadvantage due to their limited access to technical knowledge and market information, which grants traders considerable influence over both the scope and design of the projects (Bolton et al., 2023).

Within the context of cohabiting households, such as roommates, decision-making around retrofit is a collective endeavour and hence can be more complex. Cohabiting-household decision-making processes are heavily influenced by interpersonal dynamics and are frequently shaped by gender norms and roles within the household (Bolton et al., 2023; Hargreaves & Middlemiss, 2020). Gendered patterns often determine who has authority over particular domains of home management, including financial planning, renovation decisions, and interactions with service providers (Meier & Rehdanz, 2010). Finally, within multi-owned buildings (e.g. apartment blocks), collective decision-making involves co-owners of the building, requiring considerable effort to build solidarity (Cairns, Hannon, et al., 2024).

5.5 Summary of findings

The findings of section 5 are summarised according to the dimensions of our analytical framework (Table 4), using the following colour-coded system:

Red: Poor: evidence has been identified, and it shows that there is limited care in this case.

Amber: Moderate: evidence exists, and it shows that there is either overall insufficient care or there is considerable variety in care (i.e. some actors at this scale demonstrate very little or no care while others demonstrate good care).

Green: Good: evidence exists, and it shows that there is a sufficient level of care.

Grey: Indeterminate: insufficient evidence to make a judgment (i.e. no studies were identified which explore this theme).

Readers should note that the analysis presented in Table 4 should be considered preliminary and indicative, offering initial insights that highlight the need for more targeted research and focused investigation. We acknowledge that these interpretations are provisional and should be approached with caution, serving primarily as a means of summarising key patterns emerging from this scoping exercise.

Table 4 — Summary of findings from case studies

Caring about
Attentiveness
Caring for
Responsibility
Care giving
Competence
Care receiving
Responsiveness
Caring with
Solidarity, mutual trust, reciprocity


Scottish Government
NNSOs
Neighbourhoods
Household

5.5.1 Scottish Government retrofit strategy

As illustrated in section 5.1, we assess the Scottish Government as performing well in terms of **attentiveness**, given its clear commitment to retrofit and recognition of the associated justice implications. **Responsibility** is rated as moderate, as there is evidence of resource allocation, but these resources appear insufficient to fully realise the aims of the strategy. **Competence** is also rated as moderate, reflecting the mixed evaluations of the strategy's effectiveness. **Responsiveness** is judged to be moderate as well: while policies have been tailored to address specific needs, such as those of fuel-poor households and traditional buildings, there has also been significant criticism from care recipients. Finally, **reciprocity** is judged to be moderate: although consultation processes are in place, there is scepticism about the extent to which stakeholder input has genuinely informed final decision-making.

5.5.2 NNSOs

NNSOs perform strongly in **attentiveness** and **responsibility**, with retrofit often central to their mission and a significant focus of their resources. **Competence** is mixed: while many NNSOs are sector leaders, challenges remain in building trust and addressing skills gaps. **Responsiveness** is unclear, due to limited evidence of feedback from care recipients. **Reciprocity** is rated as moderate, reflecting significant variation in practices, particularly between for-profit and not-for-profit organisations.

5.5.3 Neighbourhood retrofit initiatives

For neighbourhood-level institutions, **attentiveness** is rated as good, due to their clear concern for retrofit and attendant issues. These actors perform well in terms of **responsibility**, dedicating substantial resources to retrofit efforts. **Competence** is rated moderate, reflecting a mix of strong local knowledge alongside limited technical expertise. There is insufficient evidence to make a conclusive assessment of **responsiveness. Reciprocity** is considered good, with social sector organisations generally performing well owing to inclusive and democratic organisational structures.

5.5.4 Homeowner-led

In private homeowner-led retrofit, attentiveness is considered poor, as retrofit is often deprioritised in favour of cosmetic upgrades and private landlords can act as barriers. Responsibility is also low, with few resources allocated to retrofit. Competence is limited, as many homeowners lack the financial and technical capacity to carry out the work effectively. However, responsiveness is strong, since retrofit decisions are closely tailored to individual needs, albeit limited by information asymmetries between homeowners and other relevant retrofit actors. Reciprocity is moderate, with information and power asymmetries between homeowners and retrofit professionals often undermining homeowner autonomy.

6. Discussion

In this section, we present the key themes that emerged from our findings, alongside our principal contributions. Following this thematic discussion (section 6.1), we outline potential directions for future research (section 6.2) and consider the implications of our findings for policy and practice (section 6.3).

6.1 Key themes

The key themes are organised into four main areas: the value of applying a care lens to energy retrofit, an overarching lack of care, the presence of competing cares, and the significance of organisational factors.

6.1.1 The value of applying a care lens to energy retrofit

This study makes a novel contribution by applying a lens of care ethics, particularly rooted in Tronto's five dimensions of care, to critically examine the ethical, relational, and governance aspects of decarbonisation in the housing retrofit sector. Previous research has begun to demonstrate the importance of the social relational dynamics of energy retrofitting (D. Brown et al., 2025; Cairns, Southern, et al., 2024; Davis et al., 2025; Hargreaves & Middlemiss, 2020; Middlemiss et al., 2024), arguing that successful and just retrofit transitions must attend not only to technical and financial factors but also to questions of social relations. Our research was unable to identify prior work explicitly addressing the ethical implications of not addressing these social relations. By addressing this gap, the present insights paper foregrounds the importance of aspects such as attentiveness, responsibility, and reciprocity as ethical dimensions required for effective social relations to be established to enable large-scale action at multiple scales. In so doing, it bridges gaps between institutional structures and everyday practices, demonstrating how care ethics can reframe retrofit as a

social and ethical practice rather than just a technical intervention.

A key empirical contribution lies in its multi-scalar case study design, examining retrofit actors at the national, neighbourhood, and household scales and bringing together peer-reviewed research and grey literature. In so doing, the study also surfaces practical governance challenges, such as fragmentation and responsibility gaps and proposes the development of 'care-informed' retrofit governance models. By foregrounding care, the study offers a novel and action-oriented lens that deepens understandings of fairness, trust, and support in climate action.

6.1.2 An overall lack of care

While previous research has explored 'barriers to uptake' and 'systematic challenges' of retrofit (D. Brown et al., 2018; Palm & Reindl, 2018; Rosenow & Eyre, 2016), the present analysis suggests that these challenges are underpinned by a more fundamental deficit: a lack of care for retrofit, or, more specifically, a lack of consensus about what it means to care about and care for retrofit.

As demonstrated in our summary table (Table 4), there is substantial evidence of either insufficient or inconsistent care across each case study and all dimensions of our analytical framework. The most favourable results pertain to the dimension of 'caring about,' wherein both the Scottish Government and NNSOs exhibit a strong degree of **attentiveness** to retrofit. However, beyond this, there is a pervasive absence of **responsibility, competence, responsiveness,** and **reciprocity** across the four different institutional levels.

Our framework, therefore, serves as a valuable tool for identifying:

a) the ethical limitations embedded within current retrofit delivery mechanisms; and

b) the absence of a robust infrastructure capable of converting expressed concern from key stakeholders into coherent, effective implementation strategies.

6.1.3 Competing cares

Some research highlights lack of interest in retrofit (Balcombe et al., 2014) and a lack of political will (Alam et al., 2019) as significant barriers to the delivery of net-zero buildings. Our analysis suggests not so much an absence of attentiveness to retrofit as a lack of prioritisation. Across the case studies, there is substantial evidence that care for retrofit frequently competes unfavourably with care for other concerns. The Scottish Government, for instance, faces ongoing challenges in balancing commitments to social justice with the imperative to improve energy efficiency in the housing stock. Similarly, private sector organisations often find it difficult to prioritise retrofit initiatives over profit-driven objectives. At the individual level, homeowners frequently place retrofit secondary to more immediate, everyday concerns. As a result, the ability to realise care for long-term environmental risks, such as climate change, are often made practically impossible because of short-term pressures.

These competing cares can be confused with a lack or absence of care in our framework, as we note in Section 6.1.2. For instance, while it may be acknowledged that an appropriate energy retrofit using high levels of insulation and mechanical heat recovery ventilation (MHRV) systems can improve thermal comfort for residents, they fail to function and develop mould and damp problems if residents facing extreme fuel poverty shut off the MHRV to save on electric bills. Whilst this may be perceived as not caring (low levels of attentiveness and/or responsibility), it can also be argued that this is simply attentiveness and responsibility focussed elsewhere within a whole ecological view of a resident's life, in which caring is prioritised elsewhere.

6.1.4 Organisation matters

Existing research has demonstrated that different types of organisations have different strengths regarding retrofit, particularly with respect to trust (Putnam & Brown, 2021). This study contributes to that literature by highlighting how organisational type, particularly the differences between for-profit and not-for-profit organisations, shapes the degree to which practices of care are embedded in organisational infrastructure.

We did not design this study to compare private and non-private sector practices. Instead, the analysis seeks to unpack the complexities, contradictions, and

contextual nuances within and across different institutional actors operating at different scales. Through the approach of assessing performance against ethical considerations embedded in retrofit practices, however, we believe our findings suggest that private sector actors tend to exhibit comparatively lower levels of care. This finding aligns with broader critiques of the private sector's limited engagement with the relational and justice-oriented dimensions of sustainability transitions (Laakso et al., 2021), as well as other research which shows that for-profit organisations frequently lag behind public and third-sector actors in engagement with considerations beyond financial performance –such as social equity, well-being, and environmental justice – that they subordinate to profit imperatives (Scherer & Palazzo, 2012).

Prevailing arguments often posit that private sector organisations exhibit superior performance due to the disciplining effects of the profit motive, which is assumed to enhance efficiency and thereby effectiveness in addressing a range of societal challenges (Friedman, 1970). However, through the application of our analytical framework, we highlight how these same market-driven dynamics can render private sector actors less attentive to the relational and affective dimensions of care that are critical in retrofit contexts. Specifically, the prioritisation of profit by private sector actors can undermine the development of trust within households and communities – trust that is essential for enabling retrofit interventions to be implemented at greater pace and scale.

6.1.5 An infrastructure of care

Our insights paper introduces Tronto's ethics of care (Fisher & Tronto, 2003; J. Tronto, 2013) in the context of retrofit and deploys it as a framework to assess the degree of care embedded within the energy retrofit agenda at various institutional levels. Our analysis of the degree of care as shown in Table 4 highlights that it is likely that: there is a lack of consensus around 'caring about' the retrofit agenda; there is a differential degree of agency when 'caring for' retrofit activities and outcomes; and the organisation of actors across institutional levels is critical when giving and receiving care effectively. We argue that a transactional approach to care (as something that can be bought, sold, and exchanged) would amplify these three key concerns and continue to make energy retrofit a complex challenge for Scotland. Tronto's premise of care ethics is founded on a relational view of the world, whereby the connections between actors across various institutional levels are continuously attended to, as well

as the actors themselves. Lejano & Kan, p. (2022, p. 1) define relationality with respect to public policy:

"*Within the realm of public policy research, the term* relationality *pertains to the generative role that relationships have in shaping and enacting policy.* Relationality *is the condition in which policy, in its meanings and practice, emerges not just from formal, prescribed rulemaking and institution-building but also from the working and reworking of relationships among a network of policy actors.*"

Our analysis suggests that while various institutional actors may be demonstrating care in retrofit, as evidenced through their use of supporting statistics and framing language, an emphasis on care in retrofit would be better served if relationships across institutional actors and their networks were better supported. Our analysis has responded to an existing set of societal delineations as highlighted in the literature, but we found little in those discussions about the attentiveness by actors to the networks or to other actors. Here, we suggest that increased focus should be paid to infrastructures of care whereby care is able to flow through as well as across these institutional networks in novel and inclusive ways that challenge predominant hierarchies of organisation, activity, and attention.

7. Conclusions and future research

This insights paper employs a deliberately broad-brush approach, synthesising existing literature and engaging with multiple organisational scales. While this necessarily privileges breadth over depth, it has enabled the identification of systemic patterns in how institutional scales, organisational types, and infrastructural configurations interact to produce the current limitations to retrofit delivery in Scotland. In doing so, the analysis highlights the utility of the proposed framework for making sense of retrofit as a complex, multifactor system.

7.1 Further research

Importantly, the framework also holds potential for cross-national comparative analysis. Future research could investigate the extent to which retrofit approaches in different national contexts are characterised by practices of care, raising critical questions such as:

- to what extent are more effective retrofit programmes also more care-full?
- if a strong orientation toward care enhances outcomes, should the prioritisation of care be considered a necessary precondition for effective retrofit delivery?
- conversely, if care is not closely aligned with programme effectiveness, what are the implications for social legitimacy, equity, and the long-term sustainability of retrofit initiatives?

In the context of a free-market economy – in which retrofit delivery is predominantly driven by the private sector, supported by an under-resourced public sector and a precariously-funded third sector – critical questions emerge regarding where responsibility lies and the extent to which retrofit is being delivered in a genuinely caring manner. This analysis suggests that current efforts are insufficient. Applying a care lens reveals significant gaps, highlighting that a truly comprehensive and ethically grounded approach to retrofit has yet to be realised. Future research therefore needs to be devoted to creating greater clarity on how to build infrastructure that embodies to the core an ethics of care.

However, this broad analytical scope comes at the expense of a more fine-grained understanding of the lived experience of care within retrofit contexts. The analysis has not deeply engaged with the everyday experiences of retrofit recipients, which constitutes a significant area for future research. In particular, our findings point to a lack of empirical data on how recipients perceive and experience care, especially in relation to services delivered by NNSOs and neighbourhood-level actors.

More broadly, the framework offers potential for application to other complex societal challenges characterised by multiscalar institutional arrangements and diverse organisational actors. It opens up avenues for further investigation into how care is enacted, distributed, and experienced within large-scale systems of social and environmental provision.

Finally, there is a need for further conceptual development to theorise how infrastructures of care can be designed, sustained, and scaled – both within the context of retrofit and in relation to broader societal transitions.

7.2 Implications for policy and practice

Our findings highlight the critical role that social enterprises, community-based organisations, and public sector institutions can play in embedding values of interdependence, accountability, and responsiveness into the governance structures guiding the net-zero transition. These actors are often well positioned to cultivate trust and foster care-full engagement with retrofit initiatives, particularly within communities that have been historically underserved or marginalised.

One of the key challenges identified is the relative lack of attentiveness among homeowners to the urgency and importance of retrofit. Addressing this gap requires a multifaceted policy response:

a) There is a need to raise public awareness of the risks associated with climate change and the pivotal role of buildings in reducing carbon emissions.

b) Efforts must be made to alleviate competing social and economic burdens – such as financial insecurity – that often inhibit individuals' capacity to prioritise retrofit.

c) Housing policy can play a critical role; for instance, discouraging speculative private letting (e.g. through higher taxation on second homes) while expanding access to social housing may enhance care-led outcomes.

More broadly, our findings underscore the importance of developing retrofit strategies that simultaneously advance social justice and energy efficiency. Without explicit attention to equity and care, retrofit policy risks reinforcing existing inequalities and undermining public legitimacy.

From a practical perspective, there is a pressing need to enhance the care capacity of actors across all sectors. For social sector organisations, this entails deepening their commitment to care-full practices through sustained community engagement, participatory governance, and attention to relational forms of accountability.

For private sector actors, the challenge is to develop more ethically grounded business models that move beyond narrow metrics of efficiency and incorporate broader notions of care, trust, and social responsibility. This may involve new forms of partnership with the public and third sectors. However, it will also likely require private sector actors to experiment with and adopt organisational forms which are more democratic – e.g. community enterprises or cooperatives – which, the evidence presented in this paper suggests, are better placed to adopt more caring practices.

Policymakers can encourage a more caring approach to retrofit by developing regulatory frameworks that incentivise ethical conduct and penalise extractive or negligent practices. However, given the care-distorting effects of the profit motive, a more thorough approach would be to deploy regulation to reduce the

role of the profit motive in the retrofit sector. This might mean sectoral reform, making private businesses comply with a higher standard of democratic accountability to operate within the sector. If such an approach was implemented, private firms would need to adopt the structures of more democratic organisations, such as community enterprises or cooperatives, while the position of existing not-for-profit organisations within the sector would be strengthened. In either case, the effect would be to increase the capacity for care within the retrofit sector by reducing the profit motive.

Beyond these specific findings, this paper contributes conceptually and practically to the retrofit and energy transition literature. Conceptually, it extends Tronto's care ethics into the retrofit domain, demonstrating the utility of care ethics to uncover relational dynamics, ethical blind spots, and justice-related trade-offs that are obscured by more conventional frameworks. Methodologically, our multilevel design offers a novel way to operationalise care ethics in complex socio-technical systems. Practically, the study identifies governance failures and opportunities, including the importance of relational trust, the need for better integration between actors, and the urgent requirement to build 'infrastructures of care' that can support ethical retrofit delivery at scale. The implications of this work are far-reaching.

For policy, these findings stress the need to integrate care as a guiding principle in retrofit strategy, recognising not only technical performance but also the lived experiences of retrofit recipients. This may involve more inclusive governance structures, participatory planning processes, and targeted support for under-resourced communities.

Practice implications may involve organisational actors reimagining their roles, not just as service providers, but as caregivers with responsiblity for ensuring that retrofit is a supportive, empowering, and unharmful process. In particular, practitioners and policymakers should work to reduce the role of the profit motive in the retrofit sector – practitioners by adopting more democratic forms of governance and regulators through sectoral reform, demanding higher standards of democratic practice in the sector. At the same time, the capacity of the not-for-profit sector must be strengthened so that it is properly resourced to provide more consistent care-oriented business models.

In conclusion, this insights paper makes the case for a profound shift in how we conceptualise and operationalise retrofit. By reframing retrofit as an inherently ethical and relational undertaking, grounded in practices of care, we provide

a framework not only for diagnosing current failures but also for envisioning more just and effective futures. As we approach the climate emergency with increasing urgency, the challenge is not simply to retrofit more buildings but to do so in a way that sustains, supports, and repairs the social fabric on which any just transition must depend.

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