Towards Understanding the Barriers in the Decision-Making Process of EER Projects in Dutch Housing Associations: A Conceptual Framework

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Abstract: In response to the European Green Deal's climate neutrality objectives, the Netherlands introduced the National Climate Agreement ("Klimaatakkoord"), which sets ambitious long term targets for reducing national greenhouse gas (GHG) emissions, with the building sector as a critical focus. For Dutch Social Housing, which accounts for a third of the residential housing sector in the Netherlands, stricter mandates apply in the short term: all social housing units with suboptimal EFG energy labels must be upgraded to higher standards by 2028. Despite these ambitious targets, the renovation practices of Dutch Housing Associations (HAs) are stagnating, raising doubts as to whether this goal can be achieved. Dutch HAs act in a complex environment, and their decision-making process is influenced by institutional arrangements, stakeholder interactions, and market conditions, which create uncertainties and barriers in determining effective pathways for energy-efficient renovation (EER). Understanding these barriers is crucial to formulating effective strategies, such as targeted incentives or behavioural nudges, to enhance EER adoption. This article presents a conceptual framework for understanding and analysing barriers of Dutch HAs to EER adoption. It includes a literature review on the institutional context of Dutch HAs, outlines the typical EER decision-making process, and identifies barriers documented in existing research and expert interviews. The results from the interviews with four Dutch HA show practical applicability and insights into barriers. Mayor barriers lie in institutional compliance and interaction with tenants. The conceptual framework contributes to a deeper understanding of decision-making barriers of EER projects and offers insights to guide policy interventions and future research on promoting EER in the social housing sector.

1. Introduction

Buildings account for 40 % of Europe's total energy consumption and 36 % of Europe's greenhouse gas (GHG) emissions (1). The European Union has introduced the European Green Deal and, within the REPowerEU Initiative, prioritizes energy efficiency renovations (EER) as a crucial strategy to minimize carbon emission through improved building insulation and reduced energy consumption in this sector. Particularly vulnerable consumers are explicitly highlighted within these new European initiatives, prompted by volatile and elevated energy prices resulting from the energy crisis, which has driven inflation rates and intensified energy poverty within

residential housing, disproportionately impacting vulnerable population groups (2,3). In response to the European Green Deal's climate neutrality objectives, the Netherlands introduced the National Climate Agreement ("*Klimaatakkoord*"), which sets ambitious long term targets for reducing national GHG emissions, with the building sector as a critical focus (4). For Dutch social housing, which accounts for around 1/3 of the residential housing sector in the Netherlands, stricter short term mandates apply: all social housing units with suboptimal EFG energy labels must be upgraded to higher standards by 2028 (5). In practice, a higher energy label according to the Energy Performance of Building Directive (EPBD) and the Energy Efficiency Directive (EED) can be achieved through EER.

Such EERs encompass a series of upgrades and modifications of the building aimed at reducing energy consumption while improving their overall performance in energy efficiency and comfort. Key components of EER include enhancing building envelopes with insulation and high-performance windows, upgrading Heating, Ventilation, and Air Conditioning (HVAC) systems, and integrating renewable energy sources (6). Moreover, the choice of renewable energy sources with gas-free solutions for example full electrical heat pump (HP) or heating networks to ensure further decarbonisation. Those improvements should lead to reduced energy use, lower energy bills, better air quality, improve the health of occupants, and assist in combating energy poverty when targeting social housing (7).

Despite clear ambitions stated in the National Performance Agreements ("*Prestatieafspraken"*) for Dutch HAs to upgrade their existing building stock with EFG-label to at least D-label until the year 2028, the completion of energy label upgrades through EER does not reach the required speed (5). There seem to be significant influences within HAs' decision-making processes, influenced by institutional arrangements, stakeholder interactions, and market conditions, which create uncertainties in determining effective pathways for EER. EER studies pounce around the detection and classification of "barriers" towards EER, focusing on a generalization of barriers in defined categories such as financial barriers, legal barriers, technical barriers or social barriers (8–11). In this study, we provide a conceptual framework for the decision-making of Dutch HAs in their environment and the barriers that they face in the context of EER decisions.

2. Literature Review: Environment of Dutch Housing Associations (HA), Energy-Efficient Renovation (EER) Decision-Making Process and Barriers towards EER

2.1. Environment of Dutch Housing Associations (HA)

Dutch HA play a pivotal role in the residential landscape of the Netherlands, as 29% of the total housing stock is owned and managed by 284 private non-profit HAs, each with varying amounts of assets spread across different geographical locations of the country (12,13). The primary function of Dutch HA is to provide affordable housing, particularly to vulnerable citizen groups, ensuring accessibility for individuals who might struggle to secure adequate housing in the private rental market due to factors like low income, older age, or disabilities (14,15). By operating as a private non-profit organization focused on public interest, HA reinvest any profits and funds from rental income back into the sector as a revolving fund (16,17). Adding to this complexity is the regulation surrounding rent control as of 2023, the rent limit for social housing is under the rent limit for the liberalized tenancy agreement, capped at €879.66, impacting potential revenue from these properties (18). HAs do not receive any direct subsidy to fund their activities, although some indirect government support e.g. guaranteed loans, still exist (19).

Reasoning for the designation “social rental housing” is the eligibility criteria for tenants and the subject to specific regulations when providing housing by prioritizing affordability and accessibility to a particular target group (20). Even though Dutch HA have been financially independent since 1995, they are also monitored by the Dutch national government and influenced through economic, financial, and social performance agreements (16,21,22). Significant regulations in the EER context include rent control, tenant involvement in renovation decisions — such as the 70% rule, which requires at least 70% of tenants to agree to major renovation plans — budgeting, and pricing all of which influence the actions of HAs (20,23). The context of Dutch HA provides an opportunity for large-scale development of EER and is seen as a means for this market to grow and evolve in the solutions it provides (24–26). However, despite the potential for large-scale development of energy efficiency, the investments often remain undecided as barriers beyond financial limitations often hinder the decision-making of EER-projects (27). Their unique position in the market, benefiting from favourable loan terms but constrained in generating returns through rental income, presents a particular challenge in investing in EER projects (28). Even though HAs have the final decision-making power of EER investments, they need to interact with various stakeholders collaboratively. In the realm of property investment —which includes EER of existing residential buildings and goes beyond regular maintenance— it is crucial to involve multiple stakeholders in a collaborative and result-oriented manner throughout the whole process, starting from project initiation to successful completion (29). Although HA manage their own assets and are primarily responsible for EER projects, other stakeholders must also be considered and engaged to ensure successful implementation and completion of those projects (29).

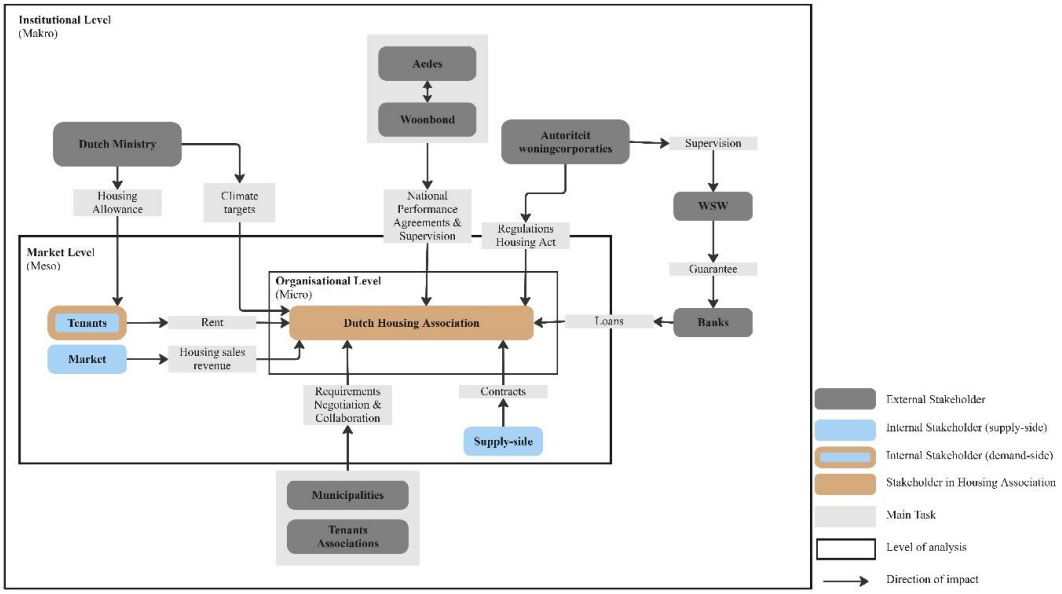

Figure 1: Environment of Dutch HAs in the Context of EER (*Compiled from several sources and designed by the author)*

Concluding this review, we display the following institutional and market environment in **Figure 1**. Those stakeholders who act on an institutional level (macro) of analysis are embedded in a socially constructed environment followed by rules and regulations, e.g. the Dutch Ministry, Aedes (Association of HAs in the Netherlands), Woonbond (National Association for Tenants), the

WSW (Guarantee Fund for HAs), and other governmental entities (19,30,31). Relevant stakeholders on a market level (meso) act profit-driven according to market requirements following negotiations and contracts such with supply-chain actors, e.g. installers, engineers, planners, producers, and contractors (11,32–35). Stakeholders on an organisational level (micro) act within the organisation in transactions according to intra-organizational governance referring to expert positions such as asset manager, portfolio manager, board member, social worker and other employment positions in HA and are responsible for the overall real estate management (36). Those internal stakeholders are directly involved in the decision-making process of EER projects. Tenants can be seen in a dual role: On the one hand, they rent houses from HAs; on the other hand, they are organizational stakeholders who can potentially influence EER projects (37).

2.2. Energy-Efficient Renovation (EER) decision-making process

The EER decision-making process involves a series of subsequent phases, each requiring specific decision points to progress to the next phase. To successfully carry out an EER process, it is essential to comprehend the decision-making phases that facilitate the transition between these phases. The EER decision-making process has been mapped out by Villalba Munoz et al. (38), Liang et al. (35); and Ma et al. (39). According to this literature, generally, an EER process starts with initiation, then continues to performance assessment, and prioritization; then the planning and design of the project of EER options; then the implementation of the decided measures and EER options and tendering; following a validation, verification; and lastly evaluation and operation.

From a Dutch perspective, the works of Albeda and Veraart (40) and Meeuwsen et al. (29) offer valuable insights into the Dutch context. While these sources are not peer-reviewed scientific publications, they provide useful indications and directions for understanding specific decision-making. This highlights a research gap that this study aims to address. According to Albeda and Veraart (40), the EER process can be summarised into five phases**:** Initiation, Feasibility, Preparation, Implementation, and Evaluation. The report from Meeuwsen et al. (29) provides indications of how an optimal process should look in theory, providing various pathways and possibilities in fictive scenarios.

The integration of the aforementioned literature forms the foundation for the EER decision-making process illustrated in **Figure 2**. The decision-making process can be described in the following phases including the task as a whole (see **Figure 2**): (1) Initiation Phase: Identifying the need for EER, assessing available resources (e.g., budget, loans, subsidies), defining regulatory constraints, and selecting target buildings. (2) Feasibility Phase: Evaluating project viability through resource assessment, knowledge exchange, performance analysis, goal setting, and project structuring. Successful feasibility leads to the next phase. (3) Preparation Phase: Engaging project partners and residents to secure support and meet the 70% agreement requirement. Finalizing an action plan and project details before execution. (4) Implementation Phase: Executing EER plans while monitoring construction, ensuring effective team coordination, and maintaining communication with tenants. Goals are continuously verified and validated. Lastly, (5) Evaluation Phase: Assessing contractor performance and project outcomes, drawing lessons for future projects.

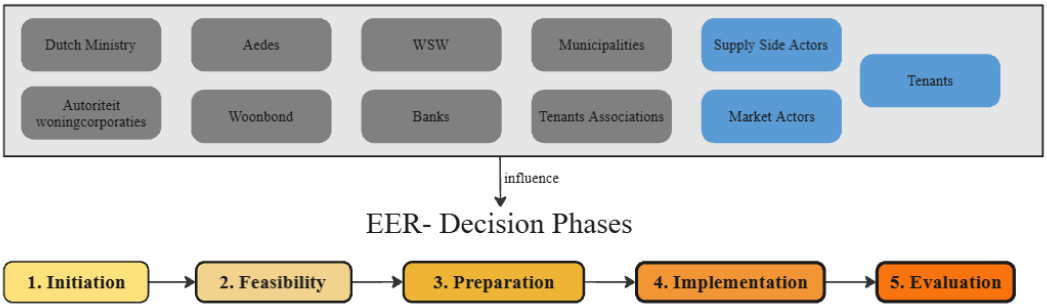

Figure 2: Key Phases of an EER Decision-Making Process (*Designed by the author, adapted and compiled from various sources: 35, 38, 39*).

2.3. Barriers in the decision-making of EER

Barriers are factors, characteristics, or determinants that influence decision-making in an obstructive way. They should be considered within a context-specific environment, such as decisions about EER. Overcoming barriers often demands more time, effort, or money, but they are not necessarily insurmountable. In EER research, such barriers have been explored from various perspectives, with most studies identifying their main categories.

The Building Performance Institute Europe provides a generalized overview of the main types of barriers and challenges encountered in building renovation. In a more general view, they have identified four main categories of barriers: [1] financial barriers including access to finance, payback expectations, investment horizon, competing expenditure, adequacy of price signals; [2] institutional and administrative barriers including regulatory and planning issues, institutional, structural, multiple stakeholders [3] awareness, advice, and skill barrier including information, awareness of benefit, professional skills and [4] separation of expenditure and benefit barriers including landlord-tenants and investor-society relationships (41).

Palm et al. (11) identified significant barriers in the planning and design stage of EER of multifamily dwellings. They categorized the barriers related to the organization of the market, information, behavioural barriers, technical, and financial barriers. According to the literature review of Cagno et al. (8), the major characteristics of barriers have their origin within the organisation (internally) or outside the organisation (externally). Technology related barriers, information barriers and economic barriers are strongly connected to external stakeholders connected to the market, government or suppliers, whereas internal stakeholders seem to reflect on behavioural, organisational and barriers related to competences. Thus, the wide array of barriers identified through a literature review range e.g. from market (energy price distortion, low diffusion of technologies or information), government (lack of proper regulation, distortion of fiscal policies), supply related (lack of interest in energy efficiency, scarce communication skills, high initial costs), economic (low capital availability, hidden costs), organisational (complex decision chain, lack of time or lack of internal control) to behavioural (lack of interest in energy-efficiency, other priorities) or lack of awareness or ignorance (42).

As reflected, the barriers towards EER stated in literature are not only focusing on the organisational (landlord) conditions itself, but also the collaboration with multiple stakeholders. In the realm of EER for existing residential buildings, it is crucial to involve multiple stakeholders in a collaborative and result-oriented manner throughout the whole process (29). Involving multiple stakeholders can lead to collaborative effort as negotiation is needed to e.g. get consensus and foresee the conflict of interest between stakeholders(43). Stakeholders are people,

institutions, and organisations who have a direct or indirect stake in the operation and outcome of EER in the building (39, 45).

3. Methodology

As part of this study, four expert interviews with Dutch HAs were conducted in June 2024 (see **Table 1**). The selected HAs have prior experience with EER projects, making them suitable cases for examining EER practices. The interviews were recorded, transcribed, and analysed using ATLAS.ti, a software-assisted qualitative content analysis tool. The empirical material was iteratively coded and key categories were inductively constructed through a continuous process of reviewing, paraphrasing, and categorizing. Based on the above conceptualization and the findings from four expert interviews, we have designed a conceptual framework (**Table 2**).

Table 1: *Overview of Interviewee Profiles in Dutch HAs*

ID	Portfolio Size	Position of Interviewee(s)	Duration	Date
A-HA	~ 18.000 units	Project Manager and Technical Advisor (1Person); Participation and Aesthetic Advisor (1Person)	~1 hour	26-06-24
B-HA	~ 17.000 units	Project Manager and Technical Advisor (1 Person)	~1 hour	12-06-24
C-HA	~ 33.700 units	Policy and Project Advisor (1 Person)	~1 hour	05-06-24
D-HA	~ 13.000 units	Strategy and Sustainability Advisor (1 Person)	~1 hour	03-06-24

4. Results and Discussion

Table 2 presents our conceptual framework derived through insights from four practical interviews with Dutch HAs. As a result of the literature studies, we have categorized the barriers that Dutch HAs face into three levels e.g. institutional level, market level, and organizational level, which describe the environment of Dutch HA when making EER decisions (see **Figure 1**). The barriers are further elaborated through interview insights. We added the affected stakeholder's composition for each barrier identified (according to **Figure 1**) and the respective decision-making phase (according to **Figure 2**).

We encountered **13 barriers** influencing the EER decision-making trajectory of Dutch HA. The barriers at the **institutional level** entail regulatory burdens. Changing rules and regulations make the EER decision for a certain technology, e.g. solar panels, or rent subsidies for tenants uncertain and risky. Further, the nature of being a non-profit organization (organizational responsibility), and the regulation which refrains HAs from raising the rent after EER act as a barrier, as HAs have to act with limited financial resources and investment (*C-HA, A-HA*). Another influencing factor that can act as a barrier is the existing municipal plan or specific neighbourhood vision, e.g. with plans to use a certain technology such as a district heating network (*A,C,D-HA*). The vision may counteract with the HA portfolio policy (*A-HA*), the internal business plans, the organizational goals, or the strategic plans. Lastly, existing legal permit procedures and approval for building transition, e.g. the requirements of legal permits for the building, like flora and fauna permit (*B-HA*) or municipal aesthetic rules (*D-HA*), or the 70 % stake tenants' agreement (*all*).

The barriers at the **market level** are connected to regulation, technology for EER, and interaction with stakeholders such as supply-side actors. From a regulatory perspective, a barrier mentioned by all interviewees is the decision between implementing a full EER or opting for a step-wise maintenance approach. This dilemma stems from the fact that EER projects are subject to more extensive regulatory requirements than standard maintenance activities. Choosing to pursue EER triggers additional obligations, such as obtaining 70% agreement from affected tenants, adhering

to rules that limit rent increases post-renovation, complying with noise regulations, securing necessary approvals and permits, and meeting energy label improvement standards. Another difficult decision-making moment that create barriers for HAs, is selecting an appropriate technology to replace the existing natural gas option. This decision depends not only on the availability of suitable technologies in the market but also on whether supply chain partners can deliver the required technologies, manpower, and expertise (*B,C,D-HA*). Continuous coordination with supply chain partners—such as contractors, installers, and technical advisors—can itself become a barrier (*A,B-HA*). This challenge is compounded by procedural requirements, such as obtaining 70% tenant agreement for major renovations. is process is sometimes managed directly by the HA or outsourced to contractors. During the preparation phase of an EER project, collaboration with contractors typically involves both technical performance oversight and responsibilities for tenant communication and engagement. However, the limited availability of skilled contractors can significantly hamper EER implementation. HAs face difficulties in securing qualified professionals, maintaining cost-efficiency, and competing within a limited market capacity.

The barriers on the **organizational level** are mostly connected to the asset specificity of HAs housing portfolio and the human heterogeneity of tenants. First, the asset heterogeneity poses a major challenge for HAs determining whether to undertake EER or proceed with a step-wise maintenance approach. The diversity in building age, condition, energy performance, size, and location makes it difficult to implement standardized EER solutions, requiring tailor-made strategies for each housing type. Unlike maintenance, which follows established protocols, EER requires case-by-case evaluations, making large-scale transitions slower and more complex. Second, the heterogeneity of tenants, e.g. the diversity of tenants' lifestyles and household compositions, or energy consumption patterns. Tenants vary significantly based on factors such as family size, work schedules, and time spent at home, making it difficult to estimate uniform energy savings across different households (*A,C,D-HA*). The interviewed HAs mentioned that it's a challenge to consult and include the tenants when it comes to making EER plans. Tenants' behavioural heterogeneity complicates this process, as HAs must navigate diverse engagement preferences, financial struggles, and differing levels of cooperation, e.g. some tenants say nothing and accept everything, others are cooperative, while some constantly complain (*A-HA*). Despite the effort that HAs have to take, they are financially constrained due to available resources and limited return on investment. The barrier of dealing with relevant stakeholders continues in the construction activities through real-time monitoring and the need for continuous adjustments. HAs face several barriers in this phase, particularly regarding communication with tenants, minimizing disruption, and maintaining project efficiency (*A,B-HA*). Tenants have to deal with discomfort during EER e.g. noise, moving construction workers in their house, and this may result in complaints to the respective HA. None of the interviewees identified construction monitoring as a barrier.

The Evaluation phase is not always part of the EER process (*B-HA*). Sometimes, it is outsourced to RSG partners or the construction company (*A-HA).* The construction company reported to A-HA that communication with tenants was the primary barrier throughout the process. Interviewees did not mention any barriers in this phase (*A,B,C-HA*).

Table 2: Conceptual Framework of EER Projects in Dutch HAs with an Overview of Encountered Barriers– (*Notes: *Level corresponds to the categorization in Figure 1; **Stakeholder as depicted in Figure 1 and 2)*

Derived from Interviews							
Level* - Barrier	**Involved Stakeholder****	**Explanation from Practice**	**Encountered in Decision-Making Phase**				
			1	2	3	4	5
Organizational - Asset Heterogeneity: Specificity of Housing Portfolio	Internal HA	E.g. Access to the condition of the housing and necessity of EER, such as energy label, building year, (*A,B,D-HA*) and location (*C,D-HA*).	X				
Market - Regulation: Choice of EER or Step-Wise Maintenance	Market / Aedes → HA	E.g. Decision to follow the route of EER due to regulatory requirements (A,B,D-HA), orientation on the demands of the Dutch housing market (*A,C-HA*)	X				
Institutional - Regulation: Changing Rules, Laws, Subsidies	Dutch Ministry → HA	E.g. Solar panels (*A,B-HA*), hybrid heat pumps (*A-HA*), subsidies for tenants (*C-HA*),	X				
Institutional – Regulation/Financial: Organisational Responsibility to Keep Cost Low/Affordable as a Non-Profit	Dutch Ministry → HA	E.g. Financial constraints in determining available resources and investment budget; regulation prohibiting rent increases after EER (A-HA),	X				
Institutional - Regulation: Compliance with Municipal Plans/Visions	Municipality → HA	E.g. Municipal plans for district heating (*A,C,D-HA*)	X				
Market - Technology: Deciding on Adequate Technologies to Replace Natural Gas	Market / Supply Side Actor → HA	E.g. Quality of available technology not adequate or absent e.g. all electrical HP (*B-HA*), insufficient space (*A-HA*), no obligations to implement HP (*C-HA*), poor building standards (*D-HA*), no DH in area (*D-HA*), lack of consistent, standardized solutions (*A,B,C-HA*), passive market approach – waiting to see what others do (*C,D-HA*).	X	X	X		
Organisational – Financial: Limited Options for Financing and investment	Internal HA	E.g. Available resources/budget, capital availability, (*A-HA),* limited investment possibilities due to rent regulations (*C-HA*).		X			
Organisational – Employee: Internal Capacity of Professionals	Professionals → HA	E.g. Internal manpower for EER projects has reached its limit (*C-HA*)		X			
Market - Stakeholder: Availability of Contractors and Technology for EER,	Supply Side Actors → HA	E.g. Available technology must fit within budget, knowledge, manpower, active engagement, and timeline for advice and implementation (all)		X	X		
Organisational – Human Heterogeneity: Diversity in Residents' Consumption Behaviour and Preferences	Tenants → HA	E.g. Designing EER projects that align with tenants' behaviour, finances, and engagement expectations (all); preparing brochures, information sessions (A-HA), and multiple EER scenarios (C-HA).		X	X		
Institutional – Regulations: Legal Permit Procedures and Building Transition Approval	Dutch Ministry → HA	E.g. Flora and fauna permits (B-HA), municipal aesthetic requirements (D-HA), 70% tenant agreement rule (all).			X		
Market – Stakeholder: Achieving 70 % Agreement Among Affected Tenants (*all*)	Tenants → HA	E.g. Procedure to reach official approval through tenant voting.			X		
Organisational – Stakeholder: Engagement with Stakeholders	Tenants → HA	E.g. Ongoing communication with tenants (*A,B-HA*), managing complaints and tenants' experiences during EER (*B-HA*)				X	

5. Conclusion

This study has provided insights into the environment in which Dutch HAs operate, the decision-making process involved in EER projects, and the potential barriers encountered by Dutch HAs. The generalizability of the proposed framework as a guiding tool for further research is justified for several reasons. First, the framework offers a structured overview of the key stakeholders

influencing the decision-making of Dutch HAs. Second, it integrates the barriers identified by practitioners with direct experience in the field. Third, it represents an integrative outcome, coherently synthesizing findings from existing literature, professional practice, and empirical research. However, this framework has certain limitations. Notably, it was developed based on four interviews, and further empirical validation through additional interviews is necessary to assess its applicability in real-world settings. Fourth, the framework offers a foundation for future research to examine these barriers through a theoretical lens. For example, Transaction Cost Theory may help reveal 'hidden barriers' that are not immediately apparent in practice. Moreover, applying behavioural insights to analyse stakeholder-reported barriers is essential for developing a more comprehensive understanding of the decision-making dynamics involved.

With this approach, we emphasize the necessity of providing a clearer and more structured overview of these barriers. Future research should focus on studying the decision-making processes of HAs or other organizations acting as landlords for social or affordable housing. This could be achieved either through multiple in-depth interviews with HA decision-makers or through a case study approach examining EER projects. Further studies should aim to identify the underlying barriers within these processes, enabling the formulation of tailored policy interventions and behavioural nudges that can support HAs in their transition toward a carbon-neutral social housing stock. A profound understanding of the barriers to EER is crucial for both social HAs and future energy policy development. We are confident that our conceptual framework serves as a valuable tool in providing the necessary clarity to design effective incentives and nudges that facilitate decision-making in this critical area.

Note: If Dutch Housing Associations are interested in this ongoing research or who wish to provide feedback, are encouraged to contact us.

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