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Investment Decisions under the revised Energy Performance of Buildings Directive

A qualitative study of strategic responses, investment priorities and renovation thresholds in the Swedish real estate market

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Abstract

The revised Energy Performance of Buildings Directive (EPBD) strengthens the regulatory framework for improving the energy performance of the existing building stock in the European Union. In Sweden, the implementation of the directive is particularly relevant for residential buildings with low energy performance, especially buildings in energy classes F and G. This thesis examines how the revised EPBD influences investment decisions among Swedish real estate companies when renovating low-performing residential buildings. It also analyses which energy efficiency measures appear most relevant in a Swedish context and whether there are identifiable thresholds where further measures are perceived as less cost-effective.

The study applies a qualitative research design based on document and policy analysis combined with semi-structured interviews. The document analysis examines the regulatory framework, implementation mechanisms and policy context of the revised EPBD, while the interview study captures strategic perspectives from Swedish real estate companies and actors involved in national implementation. The analysis is supported by theoretical perspectives on the energy-efficiency gap, principal-agent problems, investment under regulatory uncertainty and institutional pressures.

The findings show that the revised EPBD increases the strategic importance of low-performing residential buildings but does not fundamentally replace existing investment logics. Real estate companies continue to evaluate energy efficiency measures through established financial criteria, including return requirements, payback periods, financing conditions and coordination with planned maintenance. Regulatory uncertainty also affects investment timing, encouraging caution, staged planning and delayed commitments before larger irreversible measures are undertaken. Measures perceived as most relevant include operational optimisation, ventilation improvements, heat recovery systems and, where technically and economically justified, roof and facade measures. However, their relevance depends strongly on building-specific conditions, renovation cycles and practical feasibility.

The study concludes that the EPBD may strengthen the role of energy performance in portfolio-level planning and increase attention to buildings in energy classes F and G. However, its practical impact is constrained by economic, technical and strategic thresholds. The directive therefore acts primarily as a reinforcing regulatory pressure rather than as a complete transformation of investment decision-making in the Swedish residential real estate sector.

Keywords:

Energy Performance of Buildings Directive, EPBD, energy efficiency, residential buildings, Swedish real estate companies, investment decisions, regulatory uncertainty, renovation strategy, Boverket.

Preface

This master's thesis has been carried out within Risk management and Civil engineering at the division Environmental and Energy Systems studies at LTH, Faculty of Engineering, Lund University. The study examines the impact of the revised EPBD on investment decisions in the Swedish real estate sector.

We would like to express our sincere gratitude to our supervisor Joakim Haraldsson for valuable guidance and support throughout the research process. We also wish to thank all interview participants for generously sharing their time and insights, which have been essential for the empirical part of this study.

Contents

1 Introduction

This chapter provides a concise introduction to the master's thesis, outlining its overall purpose and research questions, grounded in the Energy Performance of Buildings Directive (EPBD) and the current challenges identified within the real estate sector. The chapter concludes with a list of relevant abbreviations used throughout the study.

The building and real estate sector accounts for approximately 40 percent of final energy use in Sweden, where residential buildings exhibit low energy performance and significant potential for energy efficiency improvements (Energimyndigheten, 2023). Despite this, energy efficiency measures in the existing building stock have historically been limited, partly due to weak policy instruments.

Previous research identifies barriers to cost-effective energy efficiency investments, including uncertainty, capital constraints, split incentives, and organisational factors (Jaffe & Stavins, 1994; Sorrell et al., 2004). As a result, technically and economically viable measures are not always implemented in practice.

The EPBD, first adopted in 2002, constitutes the EU´s primary regulatory instrument for improving building energy performance. While earlier revisions primarily focused on new buildings and energy certification systems, the 2024 recast introduces binding, including minimum energy performance standards and strengthened renovation obligations (European Parliament and Council, 2026). Member states are required to transpose these provisions into national legislation by 29 May 2026, which makes this thesis particularly relevant at this stage.

This regulatory shift means a significant transformation in the governance of building energy performance. For owners of residential buildings in lower energy classes (F and G), the revised EPBD may imply substantial investment needs and strategic adjustments. However, limited research has examined how these new requirements influence investment decision-making within real estate companies under regulatory uncertainty.

Against this introduction, this thesis investigates how the revised EPBD affects investment decisions among Swedish real estate companies when renovating residential buildings with lower energy performance.

1.1 Aim and purpose

The purpose of this thesis is to examine how the revised Energy Performance of Buildings Directive (EPBD) may influence strategic renovation and investment considerations within the Swedish residential real estate sector during its ongoing implementation phase. The study focuses on how regulatory developments connected to energy performance requirements are interpreted by real estate actors and how these developments may shape approaches to renovation of residential buildings with low energy performance.

1.2 Research questions

- How does the EPBD influence Swedish real estate companies' investment decisions in energy efficiency measures when renovating residential buildings in energy classes F and G?

- Which energy efficiency measures or packages of measures appear most relevant for complying with the EPBD requirements in a Swedish context?

- How do different thresholds shape Swedish real estate companies' perceptions of when additional energy efficiency measures become less feasible or cost-effective under the requirements of the EPBD?

1.3 Delimitations

This thesis is limited to the residential sector and, in particular, to residential buildings with poorer energy performance. It does not include non-residential buildings such as offices, commercial premises, public buildings or other categories of local buildings. This limitation is analytically necessary because the revised EPBD distinguishes between residential and non-residential buildings. For residential buildings, the Directive is structured around national trajectories for reductions in the average primary energy use of the residential building stock, rather than the building-specific minimum energy performance requirements that apply to non-residential buildings. The study therefore focuses on the part of the Directive that is most relevant to housing and the Swedish residential property market.

While the revised EPBD includes broader requirements related to renewable energy integration and the elimination of fossil-fuel emissions, this study focuses specifically on energy efficiency measures in existing residential buildings. This focus reflects the central role of energy performance improvements in achieving the directive's targets and aligns with the study's aim to analyse investment decisions related to renovation of low-performing buildings.

The study is further limited to the Swedish context. Although the EPBD is an EU directive, its implementation depends on national transposition, administrative interpretation and domestic policy design. Regulatory frameworks, market structures, ownership patterns and renovation practices differ significantly between Member States. To avoid confusing different institutional environments, this thesis examines how the directive is interpreted in Sweden, with a particular focus on the preparatory work of Swedish authorities and how Swedish real estate actors react to this changing framework. The ambition is therefore not to compare countries or evaluate implementation across the EU, but to analyse the Swedish case in depth.

A key limitation is that the empirical focus is on residential buildings in the worst performing part of the housing stock, especially buildings in energy classes F and G. Newly built buildings are excluded, as are higher performing residential buildings that are less directly affected by the short-term renovation logic of the directive. This limitation follows directly from the aim and research questions of the thesis, which address how the EPBD affects renovation decisions in housing with low energy performance. It is also consistent with the objective logic of the directive, where a significant proportion of the required improvement in the housing stock is expected to be achieved by renovating the worst performing buildings.

The thesis is also limited to Swedish property companies as the primary unit of analysis. The study examines how these actors interpret the EPBD in relation to renovation strategy, investment priorities and perceived cost-effectiveness thresholds. It does not attempt to analyse the behaviour of all actor groups in the housing system in equal depth. Tenants, contractors, consultants, banks and

policy-decision-makers are relevant to the broader implementation context, but they are not the main object of the analysis. Where such actors are included, it is only to the extent that their perspective contributes to explaining how the regulations are interpreted by property-owning organisations and how strategic investment decisions are shaped.

Methodologically, the thesis is limited to a qualitative research design based on document and policy analysis combined with semi-structured interviews. The study therefore does not aim to produce statistically generalizable results for the entire Swedish real estate sector. Instead, it seeks analytical depth regarding how strategically relevant actors understand and react to the revised EPBD. The results should thus be interpreted as theory-based insights into organisational reasoning and expected strategic responses, rather than as a quantitative mapping of cross-sectoral behaviour.

The study is further delimited to strategic and organizational perspectives. The interview study focuses on senior representatives from larger property companies and actors involved in the interpretation and implementation of the directive. This means that the thesis does not primarily examine technical decision-making at operational or project level, nor does it capture the full spectrum of perspectives that may exist among smaller property owners. The results are therefore most relevant for understanding strategic responses among larger and more institutionally established market players.

An important limitation is that the thesis does not include technical example calculations, building-level simulations, or quantitative estimates of energy savings, investment costs, or compliance outcomes. The thesis therefore does not aim to determine the exact economic or technical performance of specific measures. Instead, it examines how relevant measures and thresholds are perceived, interpreted, and prioritized by market actors within a changing regulatory framework. The analysis is therefore focused on strategic assessment rather than numerical verification.

The thesis is also limited by the time of the study. It is conducted during an ongoing implementation phase where the revised EPBD has not yet been fully transposed into Swedish regulatory practice. This means that some national requirements, thresholds and practical compliance conditions are still under development. The study therefore analyses how actors react under conditions of regulatory uncertainty, rather than how they react to a fully established legal framework. This uncertainty is not only a limitation but also part of the empirical relevance of the study, since one of its core interests is how investment decisions are shaped before all rules are fully defined.

Finally, the thesis does not evaluate whether the EPBD will in practice achieve its long-term policy objectives at national or EU level. Nor does it attempt to measure actual future renovation outcomes for the entire building stock. Instead, the study is limited to analysing how the directive currently affects strategic reasoning, renovation priorities and perceived decision thresholds among Swedish real estate companies operating in the residential building segment. In this sense, the thesis examines expected and interpreted consequences of the EPBD, not its final realized effects.

1.4 Definitions and abbreviations

Boverket – Swedish National Board of Housing, Building and Planning

EPBD – Energy Performance of Buildings Directive

EED – Energy Efficiency Directive

ZEB – Zero-Emission Building

NZEB – Nearly Zero-Emission Building

MEPS – Minimum Energy Performance Standards

EPC – Energy Performance Certificate

EU – European Union

EC – European Commission

NBRP – National Building Renovation Plans

Member State – A member country of the European Union

Renovictions – The risks of renovation-related displacement of tenants

CAPEX – Capital Expenditure

OPEX – Operational Expenditure

FTX – Mechanical ventilation with heat recovery

2 The Revised EPBD and the Swedish Context

This chapter presents the regulatory and policy context of the thesis. It introduces the revised EPBD, situates it within EU climate and energy policy, and explains its relevance in the Swedish context. The chapter further outlines key requirements, implementation mechanisms, and policy developments relevant to residential buildings and Swedish real estate companies.

2.1 EU context and EPBD

2.1.1 Climate Context and the Building sector

Climate change is one of the most significant global challenges of the 21st century. Rising global temperatures, increased frequency of extreme weather events and long-term shifts in climate systems have been scientifically linked to greenhouse gas emissions (United Nations, 2026). In response, the international community established collective mitigation targets, most notably through the Paris Agreement, which aims to limit global temperature increase to well below 2 °C and pursue efforts to limit warming to 1.5 °C above pre-industrial levels (UNFCCC, 2025). Achieving these objectives requires deep and sustained emission reductions across all sectors of the economy.

Within the European Union, climate mitigation has been translated into legally binding targets. The EU has committed to achieving climate neutrality by 2050 and to reducing net greenhouse gas emissions by at least 55 percent by 2030 compared to 1990 levels (European Comission, 2024a). These objectives are operationalised through an extensive regulatory framework, including the "Fit for 55" package, which revises and strengthens legislation across energy, transport, industry and land use sectors (Regeringskansliet, 2023). A central part of this policy architecture is that structural emission reductions must occur not only in energy production, but also in energy consumption.

The building sector plays a critical role in this transition. Buildings account for 33 percent of final energy consumption and energy-related emissions within the EU (European Enviroment Agency, 2025). A significant portion of this energy use is associated with heating, cooling and domestic hot water. In fact, space and water heating alone accounted for 77.6 percent of the final energy consumed by EU households in 2023, underscoring the role of thermal performance in achieving emission reductions in the residential sector (European Comission, 2023). Due to the long technical lifetime of buildings, majority of the existing buildings that will be in use in 2050 has already been built. Consequently, climate neutrality cannot be achieved solely by stricter standards for new construction, meaning the energy performance of existing buildings must also be substantially improved (World Green Building Council, 2023).

The EPBD constitutes the European Union´s primary legislative instrument for addressing energy use in the building sector. Through many revisions, the Directive has gradually expanded in scope and ambition. The most recent version introduces strengthened requirements aimed at accelerating renovation rates and improving the energy performance of the least efficient segments of the building stock (European Parliament and Council, 2026). By establishing common frameworks for the energy certification, renovation planning and minimum performance standards, the Directive seeks to reduce energy demand, lower greenhouse gas emissions and decrease dependency on fossil fuels.

2.1.2 What is the Energy Performance Buildings Directive?

The recast EPBD (Directive (EU) 2024/1275) establishes a framework for improving building energy performance across Member States and for reducing operational greenhouse gas emissions connected to buildings, with the directive's overall purpose described by Swedish authorities as reaching a zero-emission building stock by 2050 (Boverket, 2026b).

In EU-level presentation, the directive is described as focusing on increasing renovation rates (particularly for the worst-performing buildings in each country) while also updating requirements for new buildings, certificates, data systems, and enabling policies. The Commission's explanatory material describes four interlinked "focus areas" in the revised EPBD, of which renovation is central: Member States are to develop national building renovation plans that set out national strategies to decarbonise the building stock, including financing and the skilled workforce dimension, and these plans build upon earlier long-term renovation strategies (European Comission, 2024b).

A defining regulatory construct in the recast is the "zero-emission building" standard. The Commission's Q&A describes that all new residential and non-residential buildings must have zero on-site emissions from fossil fuels. Applying from 1 January 2028 for publicly owned buildings and from 1 January 2030 for other new buildings, with possibilities for specific exceptions (European Comission, 2024b). The directive's policy logic also differentiates existing building pathways for non-residential and residential buildings. For residential buildings, the Commission describes an average primary-energy trajectory approach rather than an EU-wide requirement to renovate specific individual residences: Member States are to reduce the average primary energy use of residential buildings by 16% by 2030 and 20–22% by 2035 compared to a 2020 baseline. While ensuring that at least 55% of the reduction is achieved through renovation of the 43% worst-performing buildings, and the Commission explicitly states that the revised EPBD does not impose renovation obligations on individual homeowners (European Comission, 2024b; European Parliament and Council, 2026).

Operationally, the EPBD's regulatory content functions through instruments that structure compliance and market information. The Commission describes strengthened energy performance certificates (EPCs), strengthened databases and data exchange, and the introduction of building renovation passports to support staged renovation planning, alongside tenant safeguards related to risks of "renovictions" after renovation works (European Comission, 2024b). The directive's definition of a zero-emission building is central and that Member States must, within the given timeframes, set national threshold values for allowable energy use for different types of zero-emission buildings, indicating a system where the EU-level framework requires national specification and calibration (Boverket, 2026b).

To clarify the regulatory structure of the recast EPBD, Table 1 summarises the key EU-level requirements that are most relevant to this thesis. The table distinguishes between requirements for new buildings and residential buildings, since the directive applies different compliance logics to different parts of the building stock (Boverket, 2026a).

Table 1. Key EU-level requirements in the recast EPBD relevant to residential building renovation (Boverket, 2026a).

Requirement area	EU-level requirement	Timeframe	Relevance for Thesis
Long-term objective	Transformation towards a zero-emission building stock.	By 2050	Establishes the long-term regulatory direction for renovation and investment decisions.
New public buildings	New buildings owned by public bodies must meet the zero-emission building standard.	From 1 January 2028	Shows the strengthened performance standard introduced by the recast EPBD.
New buildings generally	All new residential and non-residential buildings must meet the zero-emission building standard.	From 1 January 2030	Indicates the shift from nearly zero-energy buildings to zero-emission buildings.
Existing residential buildings	Member States must reduce the average primary energy use of the residential building stock.	16% by 2030 and 20-22% by 2035 compared to 2020	Central for the thesis because residential buildings are regulated through stock-level trajectories.
Worst-performing residential buildings	At least 55% of the reduction in average primary energy use must be achieved through renovation of the 43% worst-performing residential buildings.	By 2030 and 2035	Directly relevant to the focus on low-performing residential buildings, including energy classes F and G.
National building renovation plans	Member States must prepare renovation plans with targets, indicators, policies and financing measures.	Draft plans by 2025 and final plans by 2026	Explains how EU requirements are translated into national policy frameworks.

The table shows that the EPBD does not impose identical obligations on all building categories. For residential buildings, the directive primarily operates by reducing average primary energy use across the national building stock, rather than by imposing direct renovation requirements on individual buildings. This distinction is central to the thesis, since the empirical focus is on how Swedish real estate companies interpret and respond to the directive's residential renovation logic.

2.1.3 EPBD's EU-wide impact on its member states

At EU level, the recast EPBD functions as a governance instrument that combines common EU objectives with structured national discretion. The European Commission frames the revised EPBD as directly contributing to EU climate and energy goals by accelerating the renovation of the housing stock and reducing energy use, while allowing each Member State to decide which properties to prioritise and which policy instruments to deploy, provided that EU-level performance conditions are met. In this sense, EPBD does not operate as a single "one-size-fits-all" renovation programme; it instead establishes a coordinated compliance logic across Member States that is anchored in common metrics, reporting duties, and phased milestones, while leaving the design of national measures to domestic policy systems (European Parliament and Council, 2026).

A key mechanism through which EPBD shapes Member State action is the requirement to produce National Building Renovation Plans (NBRPs), which the Commission describes as the evolution of earlier long-term renovation strategies and as an instrument intended to guide the transformation of national building stocks into a highly energy-efficient and decarbonised stock by 2050. The NBRP framework embeds housing renovation policy more firmly into an EU-level planning cycle by

requiring a national roadmap with targets for 2030, 2040 and 2050, progress indicators, and outlines of policies, investment needs, and financing sources. The Commission further describes that draft plans must be preceded by public consultation, submitted by the end of 2025, assessed by the Commission within six months, and followed by final plans by the end of 2026, creating a recurrent reporting and review interface between Member States and EU institutions (European Comission, 2026).

Beyond planning, EPBD's EU-wide impact is also expressed through the harmonisation of information infrastructure that can affect how housing assets are described, compared, and financed. Commission guidance on energy performance certificates (EPCs) frames the A–G scale and related certificate reforms as a step toward clearer classification across the EU and as a tool for reducing barriers in the EU-wide housing market; it explicitly links improved comparability to the operational needs of cross-border actors such as banks and other financial intermediaries, as well as actors involved in renovation and property services, see Figure 1. In parallel, the Commission describes national databases and data exchange provisions as mechanisms intended to provide reliable building information to citizens, public authorities, and financial institutions, thereby supporting renovations at scale (European Comission, 2025b).

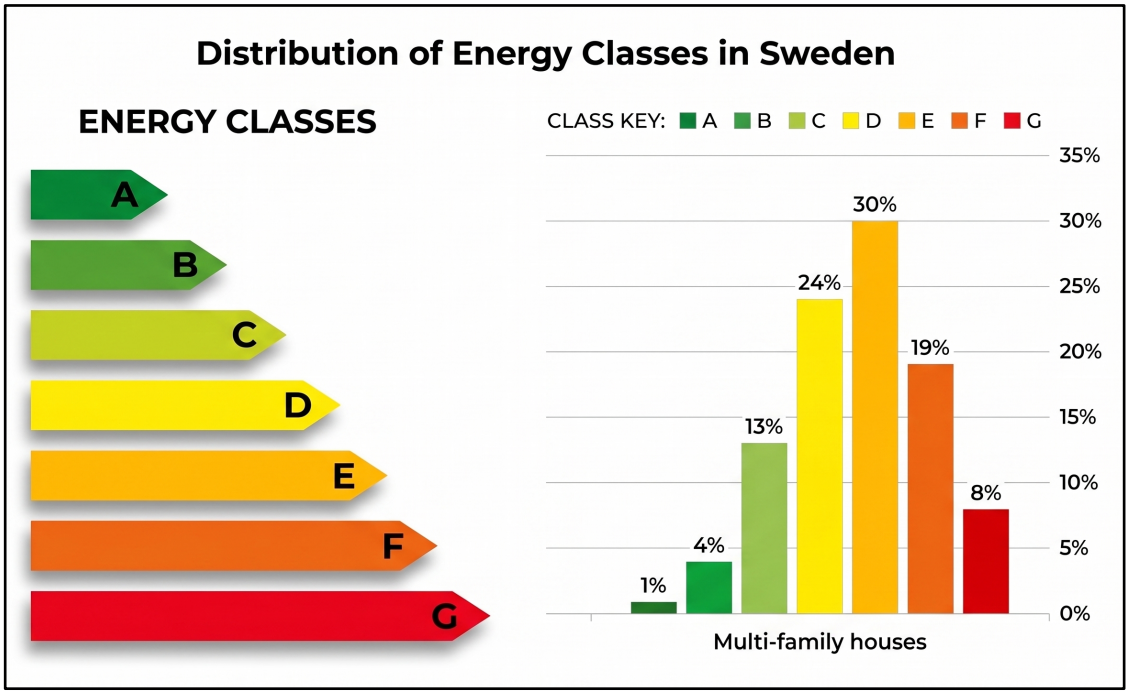

Figure 1. Distribution of Energy Classes in Sweden (Boverket, 2025a).

2.1.4 Key changes relative to the previous framework

A concise point of departure for "the old framework" is the earlier EPBD recast Directive 2010/31/EU, which required that by 31 December 2020 all new buildings be nearly zero-energy buildings (NZEB), and that after 31 December 2018 new buildings occupied and owned by public authorities also meet the NZEB standard (Economidou et al., 2020). The European Commission summarises this continuity by stating that all new buildings in the EU have been required to be NZEB since 2020, and that this requirement will be replaced by the new zero-emission building standard beginning in 2028 for new publicly owned buildings and in 2030 for other new buildings (European Comission, 2025a).

In contrast, the recast EPBD is described as introducing several shifts in both ambition and governance. First, the central benchmark for new buildings is strengthened from NZEB to zero-emission buildings, explicitly linking the new-build standard to eliminating on-site fossil-fuel emissions and to very high energy performance. Second, the approach to renovating existing buildings is described as more structured and goal-driven: non-residential Minimum Energy Performance standard (MEPS) are introduced with EU-level milestones expressed as proportions of the worst-performing stock, while residential buildings are governed through national trajectories for average primary energy reduction with a rule that renovation impacts should be concentrated in the worst-performing segment. Third, the governance instrument of long-term renovation strategies is described by the Commission as being developed into national building renovation plans with a common template and Commission assessment, aiming to improve comparability and strengthen planning for financing and workforce constraints (European Comission, 2024b; European Parliament and Council, 2026).

The main changes introduced by the recast EPBD can be summarised as a shift from energy performance requirements for new buildings to a broader framework for renovation and decarbonisation of the existing building stock. Table 2 shows the main differences between the previous framework and the recast directive.

Table 2. Key changes introduced by the recast EPBD compared with the previous framework (Boverket, 2026a).

Policy Area	Previous EPBD framework	Recast EPBD framework	Relevance for Thesis
New building standard	New buildings were required to meet the nearly zero-energy building, NZEB, standard.	The NZEB standard is replaced by the zero-emission building, ZEB, standard for new buildings.	Shows a higher level of ambition in EU building policy.
Existing residential buildings	The previous framework placed less direct emphasis on renovation of the existing residential stock.	Residential buildings are governed through national trajectories for reducing average primary energy use.	Directly relevant to how Swedish real estate companies may need to plan future renovations.
Worst-performing buildings	The least efficient buildings were not regulated through the same structured renovation logic.	A significant share of residential energy reductions must come from the worst-performing part of the building stock.	Connects the directive to the thesis focus on low-performing residential buildings.
National planning	Member States prepared long-term renovation strategies.	These are replaced by national building renovation plans with targets, indicators and Commission assessment.	Strengthens the role of national implementation and creates regulatory uncertainty during the transition.

The comparison shows that the recast EPBD gives a more central role to existing residential buildings than the previous framework. This is particularly relevant for the thesis, as the directive now more clearly links residential renovation to national energy performance requirements and to the improvement of the worst-performing parts of the building stock.

2.1.5 Timeline from implementation to the 2050 endpoint

To provide an overview of the implementation logic of the recast EPBD, Figure 2 summarises the main milestones from the directive's entry into force to its long-term 2050 objective. The figure distinguishes between regulatory and implementation milestones and building-related milestones in order to clarify both the formal policy process and the expected progression of building-related requirements (Boverket, 2026a, 2026b).

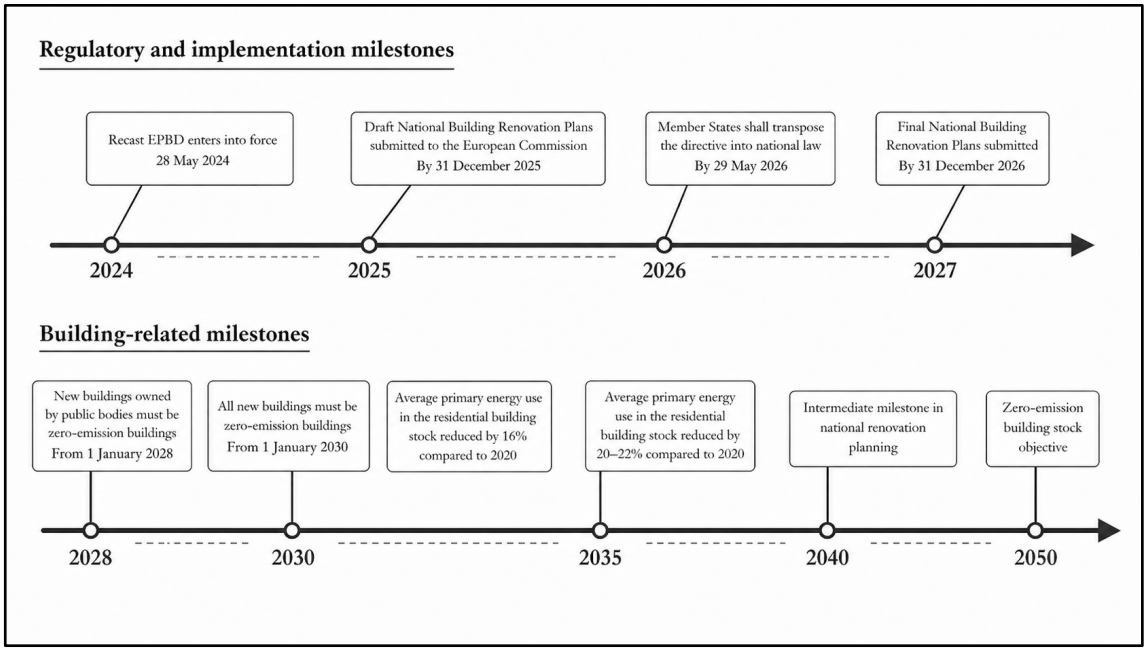

Figure 2. Timeline of the main implementation and building-related milestones in the recast EPBD (Boverket, 2026a).

The figure illustrates the main milestones in the recast EPBD from its entry into force in 2024 to the long-term 2050 endpoint. The upper timeline presents the key regulatory and implementation steps, while the lower timeline highlights the main building-related milestones relevant to the revised directive. The figure focuses on the milestones most relevant to this thesis, particularly those concerning residential buildings and the gradual strengthening of renovation requirements.

2.1.6 Who and what EPBD affects in the residential context?

Although EPBD is formally a directive directed at Member States, its practical footprint in the housing sector is distributed across multiple actor groups that interact through markets, regulatory compliance, and service provision. At the level of the property stock, the directive's trajectory approach is framed around the average primary energy use of the national residential building stock and the priority renovation of the worst-performing segment. This means the "affected unit" is simultaneously collective (portfolio-level performance of the national housing stock) and granular (properties situated in the lowest-performing segment become the primary focus of renovation policies and financing instruments). Commission guidance clarifies that Member States are expected to identify, quantify, and monitor the worst-performing share using national data and methodologies, and to report whether renovation progress is being achieved through renovation actions, rather than through stock turnover such as demolition and new construction (European Comission, 2024b, 2025b).

For housing owners and landlords, EPBD's influence is primarily mediated through (a) the national policy instruments used to meet the trajectory targets and (b) the strengthened information and

compliance tools that structure renovation decision-making. The Commission characterises one-stop shops as required advisory infrastructure to support citizens in improving their homes, and it describes the building renovation passport as a tool intended to help owners plan staged renovation journeys. In practice, this positions owners and landlords within a more formalised "renovation pathway" ecosystem where advisory services, finance offers, and compliance documentation are designed to interact (European Comission, 2024b).

Tenants and residents are also described as directly implicated, not by being assigned direct renovation obligations, but through the social and distributional impacts of renovation strategies and market transparency mechanisms. The Commission explicitly links EPBD to strengthened tenant safeguards, requiring Member States to introduce measures addressing risks of renovation-related displacement (often discussed in the EPBD context as "renovictions"). In addition, commission guidance for trajectories stresses that renovation efforts should not disproportionately exempt rental residential buildings or units, indicating that the rental segment is expected to be part of the national renovation effort rather than structurally shielded from it. Together, these provisions frame tenants as a protected group within a tightening renovation policy environment, while also signalling that rental housing is not intended to be treated as an "exception category" for meeting the housing-stock trajectory (European Comission, 2024b, 2025b).

At the level of firms and organisations operating in the housing ecosystem, EPBD affects the renovation and housing value chain through demand, competence, and verification structures. The Commission presents improved energy performance as a driver of jobs and competitiveness in the construction industry and clean-tech sectors, and it frames renovation scale-up as requiring financing capacity and skilled workers. Commission EPC guidance additionally describes mechanisms for controlling compliance in property advertising, such as verification of EPC disclosure in property listings and potential for automated checks, illustrating how information duties can create operational compliance tasks for property managers, real-estate intermediaries, and digital housing platforms (European Comission, 2025a; European Parliament and Council, 2026).

2.1.7 Potential penalties for non-compliance

The EPBD's enforcement model combines EU oversight of Member State implementation with nationally determined enforcement and penalty regimes. In Commission guidance on EPCs and independent control systems, enforcement and penalties are described as a key part of ensuring scheme integrity and a level playing field; the guidance notes that Member States may introduce penalties for independent experts who fail to produce EPCs of sufficient quality and reiterates that penalties must be effective, proportionate, and deterrent, linked to the directive's penalties provision (European Comission, 2025b).

At national level, Swedish law provides a concrete illustration of how "penalties" may be implemented for related obligations that sit within the EPBD policy domain. Under the Swedish Energy Declaration Act (Lag (2006:985) om energideklaration för byggnader), the supervisory authority may issue the injunctions needed to ensure that legal obligations are fulfilled, and such injunctions may be combined with a conditional fine (Sveriges Riksdag, 2020). Swedish authority guidance further describes compliance pressure through transaction-related information duties: if an energy declaration exists when a building is offered for sale or rent, the owner must ensure that the energy performance information is stated in advertising, which creates a compliance linkage to property markets and consumer information practices.

2.1.8 Why EPBD is relevant now and what does it target?

The directive is temporally salient because the period from entry into force to national transposition and early planning deliverables is framed by the Commission as a compressed implementation window. The Commission indicates that the revised EPBD entered into force in 2024 and must be transposed into national law by May 2026, while the first cycle of draft NBRPs is due by December 2025 and final plans by December 2026. This sequencing places immediate emphasis on national planning capacity, data readiness, and policy instrument design, rather than treating EPBD as a distant 2050-only horizon (European Comission, 2025b; European Parliament and Council, 2026).

The focus on less energy-efficient properties is framed by the Commission as a response to both technical potential and social objectives. The worst-performing residential buildings are defined as the 43% of the housing stock with the lowest energy performance, and Member States are required to ensure that at least 55% of the energy performance improvements (toward the average primary energy reductions) are achieved through the renovation of these worst-performing properties. The Commission also argues that these buildings are typically where renovations can be the most cost-effective, and it explicitly links targeting to the social dimension by noting that households exposed to energy poverty are more likely to live in worst-performing buildings. Commission technical guidance further operationalises this targeting logic by describing how Member States can identify the worst-performing share using primary energy metrics and by emphasising that the "55% sub-target" must be achieved through renovation actions (European Comission, 2024b, 2025b).

The "extra pressure" dynamic arises from how EPBD combines flexibility with enforceable accountability. Rather than prescribing a uniform renovation obligation for each homeowner, the Commission describes a framework in which Member States must meet harmonised outcome constraints (average-reduction milestones and prioritisation rules) while being free to choose the mix of measures and target groups. This shifts the regulatory question from whether a state "has policies" to whether those policies produce measurable property-level change in the housing sector on a defined timetable. NBRPs reinforce this logic by requiring quantified targets and progress indicators, and by placing national plans into a process where the Commission may assess drafts and issue recommendations that Member States must take due account of. This introduces reputational and administrative pressure, and it also increases comparability between national approaches by standardising how strategies and progress are described (European Comission, 2024b).

The directive also appears designed to influence market cognition, how housing actors perceive value, risk, and "normal" performance, by making energy performance more visible and more standardised. The Commission frames EPC reforms as making certificates clearer, more reliable, and more visible, including via strengthened disclosure in property advertising and expanded trigger points (such as major renovations and renewal of rental contracts). Commission guidance on EPC classes explicitly describes the A–G system as facilitating EU-wide housing market functioning and cross-border finance operations (while cautioning against simplistic cross-country comparison without methodological context). In combination with national databases and aggregated publication, EPBD thereby supports a "datafication" of housing energy performance: performance becomes a routinely documented attribute that can influence financing conditions, renovation sequencing, and compliance checks, rather than remaining a technical parameter addressed only in specialist contexts (European Comission, 2024b, 2025a).

2.2 EPBD implications for Swedish real estate companies

2.2.1 The targeting of low-performing housing

In Sweden, the recast EPBD is summarised by Boverket (2025a) as imposing an obligation to improve the average energy performance of the national residential building stock rather than requiring renovation of each property. The baseline for the trajectory is 2020. In Swedish preparatory material, the directive's basic milestones are operationalised as a 16% reduction in average primary energy use from 2020 to 2030 and a 20–22% reduction from 2020 to 2035. Although the obligation is stock-level, the directive's targeting logic requires that at least 55% of the reduction be achieved within the 43% worst-performing share of the housing stock; Member States may define this share by number of buildings or by heated area. For residential portfolio owners, this design implies that renovation prioritisation is expected to concentrate on the bottom segment, likely overlapping with buildings that will be classified in the lowest energy classes once the A–G scale is implemented nationally (Boverket, 2025b, 2026b).

2.2.2 Swedish renovation pacing flexibility

Boverket (2025b) highlights a pacing mechanism that can influence how rapidly Swedish housing portfolios are expected to change: Member States that have progressed far in reducing fossil energy use in buildings may adjust the 2030 and 2035 milestones on the basis of a linear reduction pathway from 2020 to the common 2050 endpoint. This is presented as easing interim milestones while keeping the endpoint unchanged. The central governance interface is the National Building Renovation Plan (NBRP): the first Swedish draft plan is due to the Commission by 31 December 2025 and the first final plan by December 2026, after a Commission assessment and possible country recommendations. In Sweden, the preparatory timetable includes an October 2025 delivery of a draft plan and a November 2025 compilation of consultation results, while Boverket's published schedule sets out a 1 March 2026 delivery to government of proposed residential trajectories and an October 2026 delivery of the final plan (Boverket, 2026b; Regeringskansliet, 2024).

2.2.3 Company-facing challenges and possibilities

For Swedish residential real estate companies, the EPBD's stock-level targets translate into practical challenges in data, compliance, and investment planning. On data readiness, Boverket's (2025b) baseline work for the 2020 starting point reports that fewer than 20% of residential buildings had a valid energy declaration in the national register, even though the EPBD's monitoring logic depends on identifying the worst-performing share and tracking progress. On compliance processes, the Swedish Government proposes that energy declarations must be produced after major renovations affecting a significant part of the building envelope and when rental contracts are renewed; it also introduces a simplified update route to reflect implemented measures (Regeringskansliet, 2025). The same proposal links the EPBD's renovation-passport concept to a voluntary "energy renovation plan" prepared by a certified energy expert, and introduces inspection intervals for heating-, ventilation-, and air-conditioning systems (three or five years depending on nominal capacity). Finally, the move toward an A–G scale, where class G corresponds to the worst-performing part of the national stock at implementation, increases the prominent of low-performing assets (likely overlapping with future classes F and G, depending on Swedish thresholds). From an investment perspective, Boverket discusses barriers such as split incentives under warm-rent arrangements and other principal–agent problems, while Swedish Energy Agency stresses that cost-effectiveness often depends on aligning energy measures with necessary renovation cycles ("opportunity windows") and sequencing measures so that later rework is avoided (Boverket, 2025b; Energimyndigheten, 2025).

In the Swedish implementation context, the most relevant numerical targets for residential property companies relate to the proposed development trajectory of the housing stock rather than building-specific minimum energy performance requirements. Boverket proposes that Sweden use the flexibility mechanism allowed under the revised EPBD, as the share of fossil fuels in energy use in Swedish residential buildings is below 15 percent. This results in a significantly less stringent interim strategy for 2030 and 2035 than the general baseline requirement in the EPBD, while still requiring a long-term reduction in average primary energy use by 2050. The values most relevant for Swedish residential property companies are summarised in Table 3 (Boverket, 2026a).

Table 3. Proposed Swedish EPBD trajectory for residential buildings based on Boverket's proposal (Boverket, 2026a).

Category	2030	2035	2050	Relevance for Swedish Real Estate Companies
EU baseline requirements for residential buildings	16 % reduction	20-22 % reduction	Towards Zero-Emission building stock	Defines the original EPBD ambition before Swedish flexibility is applied.
Proposed Swedish trajectory, total stock	3.36 % reduction	5.04 % reduction	10.07 % reduction	Shows that Sweden proposes to use the flexibility mechanism due to the low fossil share in residential energy use.
Proposed Swedish trajectory, residential buildings	102 kWh/m²/year	101 kWh/m²/year	95 kWh/m²/year	Most relevant for residential real estate companies. Energy savings will be measured per square meters for the total portfolio.
Reduction in residential buildings	3.40 % reduction	5.10 % reduction	10.19 % reduction	Indicates the expected average improvement pathway rather than a building-specific legal threshold.
Additional requirements from EU	At least 55% of the savings must come from the 43% worst-performing residential buildings.			Particularly relevant for buildings in poorer energy classes, since regulatory attention is directed toward the worst-performing part of the stock.

Unlike non-residential buildings, where EPBD implementation is linked to building-specific MEPS thresholds, the Swedish residential pathway is formulated at the stock level. This distinction is important for the thesis, since it means that residential real estate companies are primarily exposed to portfolio-level performance pressure rather than immediate legal requirements for each residential building.

3 Theoretical Framework

This thesis will later operationalize theoretical framework categories A–D in the methods chapter; the theory section presents the framework category A-D. The framework is used to interpret how EPBD may change investment decisions.

3.1 Energy-efficiency gap and barriers [A]

The energy-efficiency gap describes the difference between the energy-efficiency investments we observe and an assumed "optimal" level of investment. Jaffe and Stavins (1994) stress that the idea is only useful if we first define what "optimal" means (e.g., engineering potential vs what is privately optimal for firms) and if we separate market failures from other real-world frictions that slow or prevent adoption. Allcott and Greenstone (2012) sharpen the question: the key issue is not whether there is "untapped potential" in an engineering sense, but whether there are investment inefficiencies that policy can correct. They also emphasise that the size of any gap is empirical and that policy should match the specific failure rather than assuming every efficiency measure is a "win–win.".

Firms may underinvest when they lack reliable information about baseline energy use, retrofit performance, costs, or realised savings, and labels / audits are often justified as tools to reduce such information gaps. Evidence from Sweden on energy performance certificates (EPCs) treats EPCs as an information remedy and finds limited average effects on investment, with more targeted impacts for certain measures, suggesting that information can help, but rarely removes all barriers on its own. (Broberg et al., 2019). EPC datasets can also be hard to use at scale if data quality and structure are uneven, which limits how well firms and analysts can rely on them for decision-making (Pasichnyi et al., 2019).

Even if a measure looks cost-effective on paper, it can be unattractive once "hidden" costs are included (procurement, coordination, tenant communication, access to property, disruption, internal time). The literature highlights that these costs can be decisive in practice (Jaffe & Stavins, 1994). Swedish evidence shows that transaction costs can be a major driver of renovation (in)action, implying that higher renovation rates may require reducing these costs rather than only changing energy prices or information (Lundmark, 2024). A Swedish survey also points to hidden costs and bounded rationality as obstacles in real decisions (Blomqvist et al., 2022)

Even when they have enough information, organisations may still rely on simple rules of thumb (such as strict payback rules) and may be slow to change their usual ways of working. Allcott and Greenstone discuss behavioural failures as a possible reason for underinvestment and as a motivation for targeted policy (Allcott & Greenstone, 2012). Schleich et al. (2016) clarify that the "implicit discount rates" often observed in energy decisions may bundle time preference with bounded rationality, limited attention, and external barriers, helping explain why firms use high hurdles even when savings seem attractive. Swedish survey evidence also underscores bounded rationality and organisational conditions as important barriers (Blomqvist et al., 2022).

Retrofit outcomes vary due to technical performance uncertainty, resident behaviour, and integration risks in complex renovations. These uncertainties can rationally raise required returns and reduce adoption. Swedish case evidence from building construction projects finds risk as a key barrier category alongside slow organizational change and knowledge constraints (Carlander & Thollander, 2023). Underinvestment can also occur because energy upgrades compete with other investments under rationed capital. A measure can be "profitable" in isolation but still lose when firms face internal budget ceilings and compare projects with different risk profiles (Jaffe & Stavins, 1994).

Swedish evidence shows that perceived barriers vary with organisational conditions and that "access to capital" is often cited as important (Blomqvist et al., 2022).

While split incentives are treated in category B, category A recognises that incentive misalignment and information asymmetry can be embedded within "the gap". Empirically, landlord–tenant split incentives can lead to underinvestment by landlords, reinforcing that some gaps are rooted in contractual structure rather than technical ignorance (Melvin, 2018).

3.2 Principal–agent problems and split incentives [B]

Principal–agent theory describes situations where one party (the principal) relies on another party (the agent) to take actions, but their interests and information differ. In building energy efficient this often appears as a split incentive: the actor who must pay for an upgrade (often the owner/landlord) does not fully capture the benefits (often reduced energy bills or comfort enjoyed by tenants), or vice versa. Principal–agent conflicts ("split incentives") are widely recognised as a key market-failure explanation for underinvestment in energy efficiency, especially in rental housing (Gerarden et al., 2015). The Swedish context is particularly relevant because many multifamily properties operate with "warm rent" arrangements where heating costs are included in rent, shaping who experiences savings and how rent increases interact with energy retrofits (von Platten et al., 2022)

Split incentives arise when renovation costs and benefits fall on different actors. A classic pattern in building energy efficient is that landlords finance investments while tenants experience the resulting energy savings or comfort improvements. In such settings, energy retrofits are often associated with rent increases, and the net effect can vary depending on project scale. Smaller projects may provide cost relief for tenants, while more extensive renovations can create cost burdens, particularly for low-income households. This illustrates how contractual arrangements and rent-setting mechanisms influence both the feasibility and the social acceptability of energy efficiency investments (von Platten et al., 2022).

Contracts and rent arrangements determine whether landlords can recover retrofit costs and whether tenants internalise energy costs. When heating is bundled into rent (warm rent), tenants may not perceive direct energy savings, and rent negotiations become central to the feasibility and acceptability of deeper retrofits. Research suggests that landlord–tenant inefficiencies can persist even in settings where EPC information must be disclosed, implying that information alone does not fully resolve the contractual and incentive structure (Petrov & Ryan, 2021). Even where costs and benefits could be shared, information asymmetry can prevent efficient agreements. Tenants may not observe building energy quality or may not fully value it when signing contracts, reducing landlords' incentive to invest (Melvin, 2018). Melvin provides evidence consistent with landlords underinvesting in multiple categories of residential energy efficiency when tenants pay utility bills, framing asymmetric information as a key feature of the problem. Petrov and Ryan (2021) show that the landlord–tenant problem can persist even when EPC disclosure is mandatory, suggesting that information disclosure is helpful but not sufficient. Because split incentives are structural, remedies often focus on reshaping how costs and benefits are allocated, through bundled "package" solutions, performance-based contracts, or arrangements that allow both parties to gain. A practical implication from the landlord–tenant dilemma literature is that single instruments may be insufficient and that solutions often require a package combining contractual design, information, and organisational routines (Ástmarsson et al., 2013).

In multifamily retrofits, implementation requires tenant coordination (access, disruption management) and often rent changes, making acceptance a key constraint. Swedish qualitative work highlights that tenants have varied attitudes and levels of engagement in energy renovations, ranging from satisfied to resistant, which can shape project legitimacy and transaction costs (Palm et al., 2020).

It also shows that extensive retrofits can impose cost burdens on tenants, especially low-income groups, implying that social acceptance and affordability can become binding constraints for deep retrofits (von Platten et al., 2022).

3.3 Real options and investment under regulatory uncertainty [C]

Real-options theory describes how the irreversibility of an investment and uncertainty about future conditions can give the investor an option value of waiting before committing. In the context of building energy efficient, this means a property firm might delay or phase a renovation until it learns more about future energy prices, technology costs, or policy requirements. This is especially relevant under EPBD-related uncertainty: since the exact timing of future standards or support schemes is not fully known, firms may hold off on investments in order to avoid regrettable expenditures if policies change (Dixit & Pindyck, 1994). The Swedish context adds specifics: for example, if new regulations or subsidies are expected in the 2026–2028 period, a firm might delay measures now, or invest in small steps, rather than do everything immediately.

Real-options analysis predicts that uncertainty makes delay optimal when investments are partly irreversible. A firm faces a "now-or-later" choice and waiting has value because it resolves uncertainty. In practice, this means a high expected rate of return is required to justify immediate investment. A retrofit case study demonstrates that considering uncertainty (and the option to wait) raises the break-even threshold for upgrades compared to a simple net-present-value rule. It shows that price volatility and irreversibility can justify postponing measures to a later time (Kumbaroğlu & Madlener, 2012).

Volatility in energy prices or demand adds to uncertainty. If future energy costs are uncertain, the value of savings from an energy retrofit is uncertain. High volatility increases the option value of delay (since prices might spike or fall). Regulatory timing also matters: an impending EPBD compliance deadline may create a "deadline effect." Firms might delay until just before the deadline, or stagger investments to manage cash flow. Many retrofit costs are sunk (walls once insulated can't be "uninsulated") (Ástmarsson et al., 2013). Irreversibility raises the value of partial, reversible steps. Firms may choose staged investment: start with low-cost measures now and leave larger commitments for later, retaining flexibility. For example, a building owner might first install smart thermostats (reversible) and delay major facade renovation.

Uncertainty about future EPBD details (e.g., exact compliance requirements, available incentives) effectively raises firms' investment "threshold." A measure that looks reasonable under a certain timeframe might be rejected if policy is unclear. For example, if the future return on insulating walls depends on a government grant that is not confirmed, a firm might deem the upgrade too risky. Because of uncertainty, firms may use higher discount rates or add risk premiums to expected savings (Lundmark, 2024). This makes payback periods look longer and lowers the net present value. A building company might say "We require at least 10–year payback under uncertainty," which effectively filters out many efficiency measures.

3.4 Institutional pressures and strategic responses [D]

The energy efficiency gap literature explains why economically rational measures are not always implemented, but it does not fully capture how regulatory frameworks and legitimacy concerns shape firm behaviour. To address this dimension, we draw on institutional theory (DiMaggio & Powell, 1983; Scott, 2013) which conceptualises organisations as operating within a system of formal rules, norms and shared expectations that structure and constrain decision-making. According to institutional theory, firms adopt certain practices not only for efficiency reasons but also to gain or

maintain legitimacy. In the Swedish EPBD context, real estate companies operate under increasing regulatory inspection, evolving professional standards, and competitive benchmarking.

Coercive pressures stem from formal rules, laws and enforcement mechanisms (DiMaggio & Powell, 1983). The revised EPBD introduces binding requirements for minimum energy performance, which member states must transpose into national legislation. Once implemented in Sweden, these requirements constitute direct regulatory constraints on property owners. Under coercive pressure, firms may undertake renovations primarily to ensure compliance and avoid sanctions, reputational risk or reduced asset value. In such cases, investment decisions are framed as mandatory rather than strategic. This aligns with regulatory compliance theory, which suggests that firms respond predictably to clear, enforceable standards (May, 2004).

Normative pressures arise from professionalisation processes, shared standards, and expectations within an organisational field (Scott, 2013). In the Swedish real estate sector, sustainability reporting frameworks, green certifications (e.g. Miljöbyggnad), and investor expectations contribute to an evolving definition of what constitutes responsible asset management. Research on sustainability transitions shows that such normative pressures can gradually redefine "standard practice" in industries (Geels, 2011). In this context, firms may adopt renovation measures that go beyond strict legal compliance because these measures are perceived as industry best practice or necessary to maintain credibility among tenants, investors and financial institutions.

Mimetic pressures arise when organisations respond to uncertainty by looking at what others are doing. More recent research shows that imitation is often a rational response in unclear regulatory environments, as it reduces perceived risk (Lieberman & Asaba, 2006). When rules are still being interpreted, firms may follow early movers or well-known actors rather than develop completely new strategies. In the case of the revised EPBD, ongoing national interpretation and regulatory uncertainty may therefore encourage firms to benchmark competitors. This can lead to convergence in renovation strategies, even if firms differ in size, portfolio structure, or financial capacity.

Institutional research also shows that formal compliance does not always lead to substantial organisational change. Contemporary studies on decoupling suggest that organisations may adopt policies and reporting practices while implementation remains partial (Bromley & Powell, 2012). In sustainability governance, firms sometimes improve documentation and certification outcomes without fully transforming underlying operations. In the EPBD context, this may mean prioritising visible energy performance improvements while postponing more capital-intensive measures.

Renovation decisions can also be understood through a resource dependence perspective. Firms rely on external stakeholders such as banks and investors for access to capital. Modern research shows that environmental performance increasingly affects financing conditions (Flammer, 2021). Access to green bonds or sustainability-linked loans may therefore create additional incentives for energy renovations. In this way, investment decisions may be shaped not only by regulatory compliance, but also by financial and reputational considerations.

4 Method

This chapter presents the methodological approach of the thesis and explains how the study has been designed to address the research questions. It outlines the overall research plan, including the document and policy analysis and the interview study. The chapter also describes how these different methods were combined, and discusses the study's validity, reliability, limitations, and ethical considerations.

4.1 Research Plan

The research plan was developed to provide a structured approach to answering the study's research questions. The methodological framework was intentionally designed to connect theory with current literature and actors in the field to provide relevant and different perspectives. This structured approach is consistent with established design principles for integrating qualitative and quantitative components in applied research (Creswell, 2009).

The process began with a review of relevant literature and policy documents to establish the theoretical basis and clarify the regulatory framework surrounding the revised EPBD. This step enabled the identification of key concepts and provided the foundation of the study framework and directly informed the formulation of the interview questions, ensuring that the empirical data collection was theoretically grounded. Given that the revised EPBD is currently in an implementation phase, significant regulatory uncertainties remain regarding interpretation, target levels, and national translation. This uncertainty strengthens the motivation for conducting an interview study. Direct engagement with market actors is necessary to understand how the directive is interpreted in practice, how uncertainty is incorporated into strategic planning, and how anticipated requirements influence investment behaviour before final regulatory details are fully established. Examining EPBD during its implementation phase aligns with case study logic, where contemporary regulatory phenomena are analysed within their real-life context (Yin, 2002).

Finally, the theoretical insights from the literature and document analysis were linked to the empirical results from the interviews. By analysing these in relation to each other, the study establishes an analytical framework where theoretical concepts and interview responses, together form a structured basis for answering the research questions. See Figure 3 for a visualisation of the research plan.

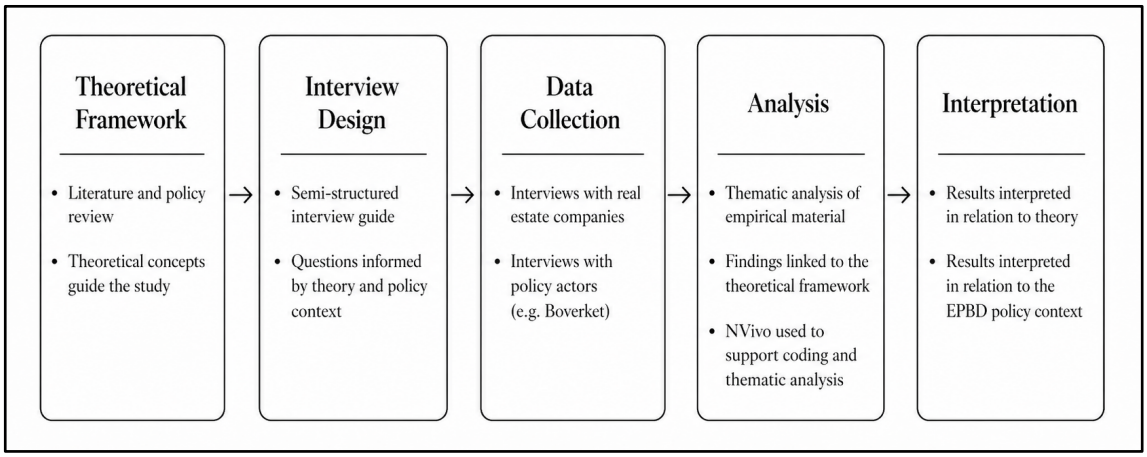

Figure 3. Research plan

4.2 Document and Policy Analysis

The document and policy analysis were conducted to systematically examine the regulatory framework that shapes the strategic environment for the Swedish real estate sector under the EPBD. The aim was to identify and interpret the formal requirements, target trajectories and implementation mechanisms that define the institutional conditions for investment and renovation decisions.

This analysis directly contributes to answering the research questions by clarifying how regulatory obligations are structured and how they can influence organisational behaviour. It identifies binding requirements, performance thresholds and timelines and analyses them through the theoretical framework established in the previous chapter. By doing so, the document analysis operationalises theoretical concepts within a concrete policy context. The document analysis, therefore, acts as a bridge between the background chapter, the theoretical framework and the empirical interview study. It establishes the regulatory basis against which the actors' responses are examined and provides the analytical basis for the development of the interview guide.

4.2.1 Selection of Documents

The document and policy analysis examines formal regulatory and institutional texts that define the framework within which the revised EPBD is interpreted and implemented in Sweden. The aim was not to provide background information, but to analyse selected policy documents as empirical material that constitutes part of the basis upon which real estate actors are expected to act. In total, the study draws on 28 documents and sources that specifically concern the EPBD and its relevance to the research questions, including its regulatory requirements, implementation process, renovation targets and implications for the Swedish building stock. In addition, 30 sources were used to support the theoretical framework, methodological approach and broader analytical foundation of the study. This distinction reflects the dual role of the literature: one part establishes the regulatory and empirical context of the EPBD, while the other provides the theoretical and methodological basis for interpreting how real estate actors respond to the directive.

The selection of documents was based on their formal authority, relevance to residential energy requirements and analytical significance to the study's research questions. The selection includes the revised EPBD Directive, official communications from the European Commission, national implementation documents, government reports and analytical publications from responsible authorities such as Swedish National Board of Housing, Building and Planning, the Government, the Energy Agency and other relevant institutions.

The selection process was based on three criteria:

(1) the document must define or interpret binding or anticipated regulatory requirements.

(2) it must directly or indirectly relate to residential buildings and energy performance requirements linked to the EPDB.

(3) it must contain elements that can be examined analytically through the theoretical framework of the study.

This type of structured use of documentary sources is consistent with principles of qualitative research design that emphasise the importance of multiple sources of evidence when analysing contemporary policies in their real-world contexts (Creswell, 2009; Yin, 2018). The document analysis focuses exclusively on formal regulatory and institutional texts, thereby excluding media interpretations or secondary commentary, to ensure analytical precision and source reliability.

4.2.2 Analysis of Documents

The selected documents and literature were reviewed and analysed by linking them to the four theoretical frameworks presented in the theory chapter. The frameworks were used as a guide to linking the literature to relevant theory in order to categorise them and draw conclusions. Thus, the four theoretical perspectives served as the basis for the literature study.

[A] Energy-efficiency gap and barriers

The analysis examined how regulatory requirements, compliance mechanisms, and performance thresholds potentially interact with known investment barriers. Attention was given to provisions that may reduce or reinforce financial, informational, or organisational constraints. Regulatory obligations were assessed in relation to how they may alter the gap between technically viable and practically implemented energy efficiency measures.

[B] Principal–agent problems and split incentives

Documents were analysed to identify regulatory frameworks that address or implicitly affect the dynamics between property owners and tenants. Mechanisms that affect cost allocation, incentive structures, and compliance responsibilities were examined to determine whether regulatory design mitigates or reinforces challenges to shared incentives.

[C] Real options and investment under regulatory uncertainty

Given that the EPBD is in an implementation phase, the analysis focused on the targets, timelines, flexibility mechanisms and transitional arrangements. These elements were interpreted through the perspective of investment under uncertainty, examining how regulatory uncertainty can create incentives for delays, phased investments or precautionary approaches.

[D] Institutional pressures and strategic responses

Formal obligations, reporting requirements, performance standards and sanctioning mechanisms were analysed as sources of coercive and institutional pressures. The analysis assessed how such pressures can shape strategic alignment and organisational positioning in the real estate sector.

The analytical procedure followed an iterative process. The documents were first reviewed in their entirety to identify relevant sections, which were then systematically categorised according to the four theoretical frameworks. This thematic structuring ensured conceptual coherence and transparency, in line with established principles of qualitative analysis (Nowell et al., 2017). By grounding the interpretation of regulations in theory, the analysis goes beyond descriptive policy review and instead identifies theoretically anchored patterns such as investment behaviour and regulatory compliance. With this method, the document analysis is clearly linked to established theoretical concepts and methods, creating a deeper connection between the literature and the empirical evidence.

4.2.3 Connection to Interview Study

The document analysis functions as a conceptual link between the theoretical framework and the empirical interview study. By examining formal regulatory requirements, timelines and implementation mechanisms, the analysis establishes the institutional context within which actors operate.

This regulatory baseline provides the foundation for interpreting the responses collected in the interviews, allowing the study to analyse how organisations respond to formal policy signals under

conditions of regulatory change and uncertainty. In this way, the document analysis defines the structural conditions, while the interview study captures the strategic interpretation and organisational response to those conditions. Together, the methods create an integrated analytical design that supports the interpretation of empirical findings in relation to the regulatory framework.

4.3 Interview Study

The interview study constitutes the central empirical part of the study. The aim was to investigate how key actors in the Swedish real estate sector, as well as representatives involved in the development and implementation of the regulatory framework, interpret and react to the revised EPBD. The interviews specifically aim to capture how regulatory requirements are translated into investment assessments, portfolio-level renovation strategies and organisational decision-making processes.

A qualitative interview method was chosen to gain in-depth insights into how strategic considerations are shaped under conditions of regulatory change and uncertainty. The use of qualitative interviews is well-established for exploring organisational reasoning and interpretative processes in complex regulatory setting (Bryman, 2016). By conducting interviews with senior decision-makers and policy actors, the study aims to understand different perspectives on how the directive is perceived. As well as how it affects risk perceptions, capital allocation priorities and long-term planning considerations.

4.3.1 Selection of respondents

The selection strategy for the interviews is anchored in the theoretical framework of the study. The goal is not statistical representativeness, but to select respondents whose roles and responsibilities make them particularly relevant to answering the selected research questions. This approach corresponds to purposive selection, where participants are selected based on their relevance to the research objectives rather than statistical representation (Bell et al., 2022; Bryman, 2016). The selection is linked to the four key frameworks developed and presented in the theoretical chapter. Such theory-driven selection is particularly appropriate in studies aiming to explore strategic reasoning and institutional interpretation.

Two main groups of actors were included.

First, senior representatives from large Swedish real estate companies were selected. These companies manage extensive and diversified property portfolios and typically have clearly defined organisational structures where sustainability and energy efficiency improvements are addressed strategically. Together, the selected companies represent a significant share of the Swedish real estate market, which enhances the structural relevance of the empirical material. The focus on larger actors is motivated by two considerations. They generally have the organisational capacity to systematically analyse regulatory changes and integrate them into long-term investment strategies. Furthermore, the size and market presence of the companies mean that their response to the EPBD is likely to impact the property market at large.

Within these companies, respondents were chosen based on their functional position. Interviewees consist primarily of energy strategists, sustainability managers, and senior executives with responsibility for overarching strategic and investment-related decisions. These individuals operate at a portfolio or corporate level and are involved in evaluating long-term renovation plans, capital allocation, and risk exposure. The study therefore seeks to capture the strategic perspective of how EPBD is interpreted and incorporated into corporate decision-making, rather than operational or project-specific considerations.

Secondly, stakeholders involved in the national implementation and interpretation of the EPBD were interviewed. This group comprises senior representatives from regulatory authorities and organisations responsible for interpreting EU directives and developing policies and regulatory proposals. These interviews were expected to provide insight into how the directive is translated from EU legislation to the Swedish regulatory framework. As well as how performance thresholds and targets are defined, and how regulatory uncertainty is communicated to the real estate market. This perspective is crucial for understanding how the communication of the regulations is intended to be perceived by the market by those who write and implement the rules.

To ensure variation within the interviews, respondents came from several different companies and institutions. To be able to compare company respondents in a representative way, respondents from real estate companies also have a similar position at each company. This allows for comparison of how similar regulatory signals are interpreted in different organisational environments, while maintaining a consistent strategic focus.

The study deliberately excludes smaller companies and individuals who work mainly at a technical or operational level. Since the EPBD operates at a national and systemic level, the analysis focuses on actors with a corresponding strategic overview. Detailed technical implementation issues are therefore outside the scope of the interviews. The number of interviews is determined by theoretical saturation, which means that data collection continues until further interviews no longer contribute significantly new insights in relation to the study's theoretical framework and research questions. See Table 4 for the complete list of respondents.

Table 4. List of respondents.

Name:	**Company:**	**Role:**
Respondent 1	Ernst Rosén	Property Developer Technology and Energy
Respondent 2	Heimstaden Bostad	Head of Energy
Respondent 3	Stena Fastigheter	Head of Energy MMX
Respondent 4	Boverket	Director General
Respondent 5	Vasakronan	Chief Sustainability Director
Respondent 6	Boverket	Responsible for implementing EPBD

4.3.2 Data Collection

Data collections were carried out through semi-structured interviews. Semi-structured interviews were particularly suitable for capturing how actors construct meaning and articulate strategic reasoning (Kvale & Brinkmann, 2009). This method allowed for a consistent thematic structure across the interviews while providing flexibility to explore the specific perspectives of the respondents. The semi-structured format ensured that all core topics related to the research questions are covered, while still allowing room for clarification and follow-up questions where relevant.

This method is particularly suitable given the focus of the study on strategic decision-making and regulatory uncertainty. The interview method allowed for detailed discussion combined with the respondent's free interpretation of the questions from their own company's perspective. This angle maintained comparability across companies and institutions while leaving the questions open to interpretation. By combining structure with openness, the method supported both systematic analysis and a nuanced understanding of how the EPBD is interpreted and implemented in practice.

The interview framework was developed deductively from the theoretical perspectives presented in the theoretical chapter and operationalised using insights from document and policy analysis. Rather than constructing questions independently of theory, the interview guide was structured to translate the different theoretical perspectives into empirical themes for discussion with respondents. This approach ensures that the information gathered in the interviews can be directly interpreted in relation to the conceptual mechanisms identified in the literature, see Figure 4.

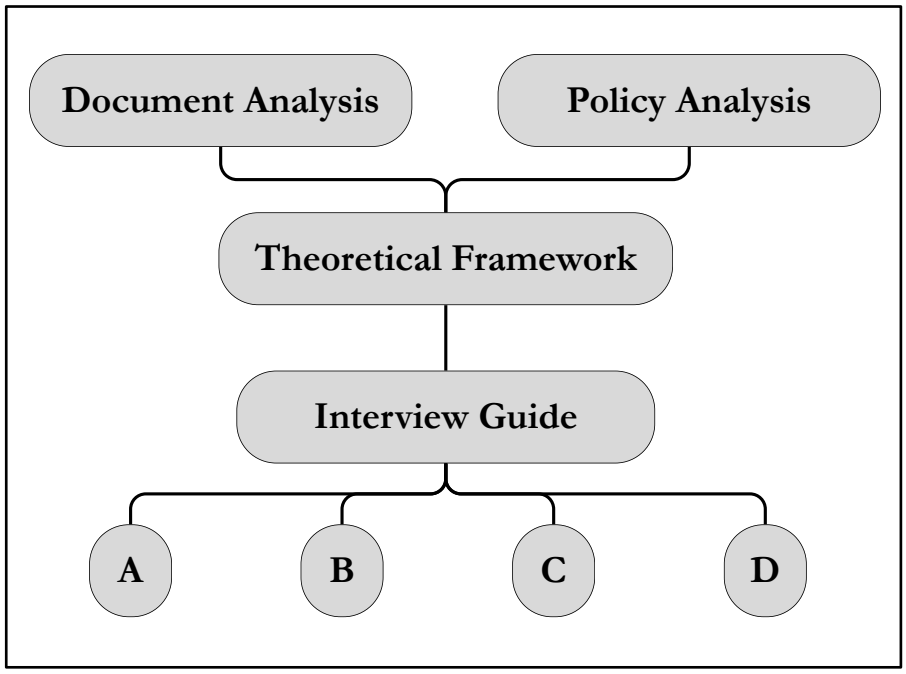

Figure 4. The process of making the interview format.

Each of the four theoretical perspectives was therefore used as a thematic dimension guiding the interview structure.

The first theme is derived from the energy-efficiency gap and investment barriers framework [A]. Questions within this theme aim to capture how organisations evaluate energy efficiency investments and what factors may prevent technically viable measures from being implemented. The interviews, therefore, explored issues such as information availability, transaction costs, internal decision rules, organisational capacity, perceived risks, and capital allocation constraints.

The second theme is based on principal–agent problems and split incentives [B]. Interview questions are designed to examine how ownership structures and landlord–tenant relationships influence renovation decisions. This includes discussions on cost allocation, rent-setting constraints, tenant acceptance, and how incentive structures shape the feasibility of energy efficiency investments in rental housing.

The third theme follows the perspective of real options and investment under regulatory uncertainty [C]. Since the EPBD is currently in an implementation phase, the interviews investigate how firms interpret regulatory timelines and uncertainty when planning renovation investments. Particular attention is given to whether companies delay investments, stage renovation measures, or adjust investment thresholds in response to uncertain future policy requirements.

The fourth theme is derived from institutional pressures and strategic responses [D]. Questions within this theme explore how regulatory obligations, professional norms, investor expectations, and competitive dynamics influence strategic decision-making. The interviews, therefore, examine how firms respond to coercive regulations, normative sustainability expectations, and applied pressures within the real estate sector.

Insights from the document analysis were used to further refine these thematic areas by identifying specific regulatory mechanisms, timelines, and areas of uncertainty within the EPBD framework. These elements were translated into interview topics that allow respondents to explain how regulatory requirements are interpreted and integrated into organisational decision-making. Through this structure, the interview guide ensures that the empirical data collected can be systematically analysed in relation to the theoretical frameworks applied in the study.

The interviews were conducted either digitally or physically depending on the respondent's availability. All interviews were recorded after informed consent and transcribed verbatim to ensure high analytical accuracy. The transcription enables systematic coding and traceability between empirical data and analysis. The transcribed interviews were subsequently imported into NVivo, a qualitative data analysis software, where the coding and thematic analysis were conducted in a structured and theory-informed manner.

4.3.3 Interview Analysis using NVivo

The analysis of the interview material was conducted through a theory-based qualitative coding process supported by NVivo. The purpose is not to treat interview responses as direct empirical results, but to interpret them through the theoretical perspectives established in the theoretical framework. This approach ensured that the empirical findings were analytically grounded and that conclusions were drawn in relation to established theoretical concepts rather than isolated statements from respondents. Such theory-driven coding is a common strategy in qualitative research and using a qualitative data analysis software supported a more systematic, transparent, and traceable coding process, which is consistent with established principles for rigorous qualitative research (Bell et al., 2022; Bryman, 2016).

After transcription, all interviews were imported into NVivo and organized as separate cases. Case classifications were also created to distinguish between different respondent groups, such as real estate companies and government agencies, and private and state-owned real estate companies. To create an additional opportunity to compare each respondent's responses from an organizational and strategic perspective. This classification structure in NVivo made it possible to compare patterns both within and between respondent categories while maintaining a clear connection between the coding and their original interviews. The coding process was carried out in several stages. In the first stage, the material was broadly coded using three overarching nodes corresponding to the three research questions. This initial coding strategy was chosen to maintain a close connection between the

empirical material and the overall purpose of the study, while avoiding premature fragmentation of the interviews into too many categories. By starting with broad codes, the analysis was able to first capture how the respondents' statements related to the focus of the thesis before moving on to a more detailed interpretation.

In the second step, each research question was further specified in a set of sub-codes. These sub-codes were developed deductively from the interview guide, the document and policy analysis, and the theoretical perspectives presented in the theoretical chapter. This means that the sub-codes were not generated solely from recurring keywords, but from analytically relevant themes such as investment barriers, incentive structures, uncertainty-driven delay, and institutional pressures. In practice, each interview was then coded line by line, and relevant parts were assigned to the appropriate coding category and its related sub-codes. The coding process was iterative, meaning that the coding structure was continuously reviewed and refined as the analysis progressed.

NVivo was therefore used not only as a storage tool but as an analysis instrument that enabled systematic coding, comparison between interviews, and clear traceability between raw data, coded segments, and final interpretation. The coded material was then examined to identify recurring patterns, differences between respondent groups, and empirical expressions of the theoretical elements discussed in the literature. The thematic analysis follows established procedures to ensure reliability and analytical transparency, where empirical observations are organised into theory-based categories to ensure transparency and analytical consistency (Nowell et al., 2017).

Through this process, the interview analysis created a structured connection between theory and empirical material, which enabled the study to draw conclusions about how the revised EPBD is interpreted and how it may affect investment decisions and renovation strategies within the Swedish real estate sector. See Figure 5 for a complete description of the method used.

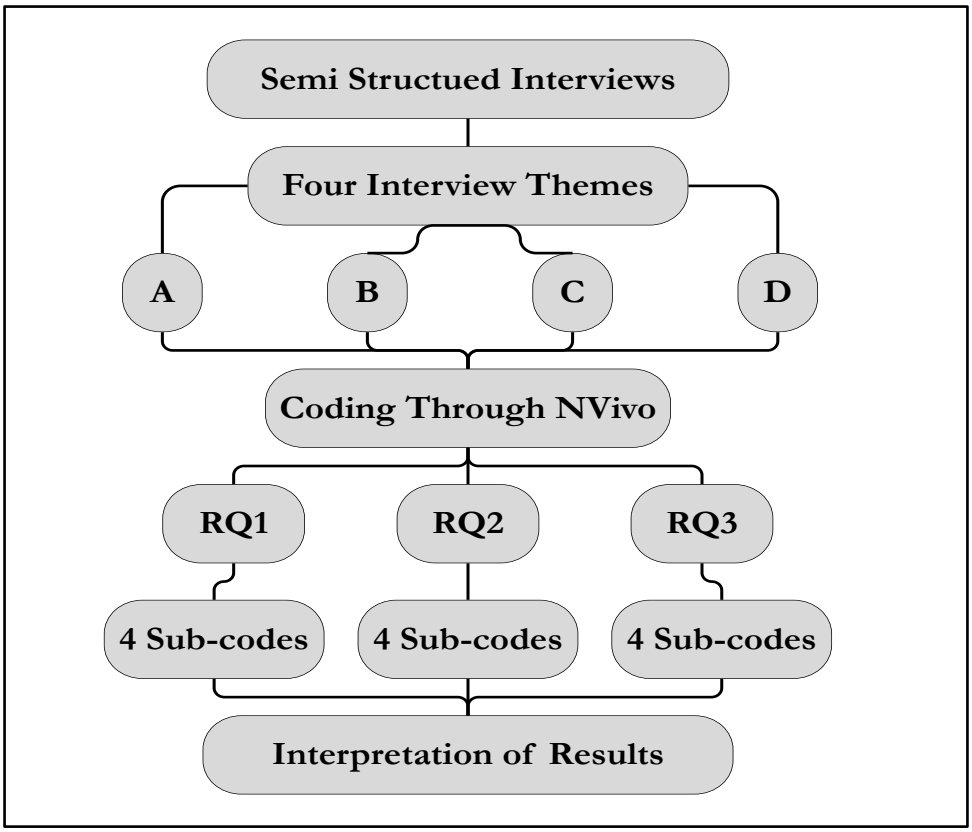

Figure 5. The method from interviews to results.

4.4 Validity and Reliability

4.4.1 Internal Validity

Internal validity concerns the extent to which the analytical conclusions of a study are logically supported by the empirical material and the theoretical framework applied. In qualitative research, internal validity is strengthened when clear links are established between theoretical concepts, empirical observations, and the interpretation of results (Bell et al., 2022). In this study, internal validity is supported through a theory-driven research design where the empirical material is consistently analysed through the four theoretical perspectives presented in the theoretical framework.

First, the interview study was designed based on the theoretical frameworks, ensuring that the data collection process was directly linked to what was identified in the literature. The structure of the interviews, therefore, reflects the perspectives used in the theoretical chapter, which allows for the interpretation of empirical observations through established theoretical constructs. This reduces the risk of drawing conclusions based solely on individual opinions or isolated statements.

Second, internal validity is strengthened through methodological triangulation. The study combines two sources of evidence: document and policy analysis and semi-structured interviews. Each component captures a different dimension of the research problem. Policy documents define the regulatory framework and formal obligations and interviews provide insight into how market actors interpret and respond to these conditions. The integration of these sources enables patterns and interpretations to be evaluated across multiple forms of evidence, which strengthens the credibility of the analytical conclusions (Creswell, 2009; Yin, 2018). Through this structured connection between theory, empirical data, and analytical interpretation, the study aims to ensure that the conclusions presented are grounded in a coherent and transparent analytical process.

4.4.2 Reliability

Reliability refers to the extent to which the research process is transparent and can be followed or replicated by other researchers (Bell et al., 2022). In qualitative research, reliability is primarily ensured through clear documentation of methodological procedures and analytical steps. In this study, reliability is strengthened through a structured and transparent research design. The methodological process is described in detail, including document selection, respondent sampling, interview procedures, and analytical methods. This transparency allows the analytical process to be clearly understood and potentially reproduced.

Reliability is further supported through the consistent use of the study's four theoretical frameworks in the analysis. These predefined analytical categories guide the interpretation of the interview material, ensuring that empirical observations are analysed systematically across all interviews. In addition, the use of a semi-structured interview guide ensures that the same thematic areas are addressed with each respondent, which increases consistency in the data collection process. Together, the transparent methodological structure and the consistent application of analytical frameworks contribute to the reliability of the study.

4.4.3 Limitations

Despite the structured methodological approach applied in this study, some limitations should be acknowledged. First, the interview study focuses primarily on larger real estate companies. Although these players represent a large share of the Swedish real estate sector and operate at a strategic level, the perspectives of smaller property owners may differ. The results should therefore be interpreted as insights into strategic decision-making among larger market players rather than a complete representation of the entire sector.

Second, the study is conducted during an ongoing implementation phase of the revised EPBD. Several parts of the Directive are still subject to interpretation and regulatory development, meaning that the policy environment is still evolving. Consequently, the responses from the interviewees reflect current interpretations and expectations rather than fully established regulatory conditions.

Finally, the study relies on qualitative interviews that capture the respondents' perceptions and strategic reasoning. While this method provides valuable insight into how actors interpret and anticipate regulatory developments, it is based on self-reported information rather than direct observation of investment behaviour. The results, therefore, reflect how organisations currently interpret and react to the regulatory framework rather than how investment decisions will ultimately materialise in practice. These limitations should therefore be considered when interpreting the study's findings and defining the scope of applicability of the conclusions.

4.4.4 External Validity

External validity concerns the extent to which the findings of a study can be generalised beyond the specific context in which the research was conducted. In qualitative research, the aim is typically not statistical generalisation, but rather analytical generalisation, where findings contribute to a broader theoretical understanding of a phenomenon (Bell et al., 2022; Yin, 2018).

In this study, the results are derived from interviews with strategically selected actors within the Swedish real estate sector and from analysis of policy documents related to the implementation of the EPBD. Consequently, the findings should not be interpreted as statistically representative of all real estate actors. Instead, the study provides analytically grounded insights into how major market actors interpret regulatory changes and incorporate them into strategic decision-making. While the results are situated within the Swedish regulatory and market context, the analytical insights may still contribute to broader discussions on how regulatory frameworks influence investment behaviour and renovation strategies in the building sector.

4.5 Ethical Considerations

The interview study involves the collection of qualitative data from individuals representing organisations within the Swedish real estate sector and public institutions. Ethical considerations were therefore integrated throughout the research process to ensure responsible handling of participant information and transparency in how the empirical material was used. Before each interview, participants were informed about the purpose of the study and how the information collected would contribute to the research. Participation was voluntary, and respondents were informed that they could decline to answer specific questions or discontinue the interview at any time without consequences. This ensured that participation was based on informed consent.

Interviews were recorded only with the participants' explicit permission. The recordings were used solely to ensure accurate transcription and reliable interpretation of the responses. Transcripts were

subsequently used as the primary material for the qualitative analysis, while the recordings themselves were not used for any other purpose. Given that the interviews involve professionals discussing organisational perspectives, special care was taken in handling potentially sensitive information. Respondents were given the option to remain anonymous or to have the study refer to their organisation and professional role. In cases where anonymity was requested, identifying details were removed from the material to protect the participant's identity.

All collected data were stored securely and used exclusively for this thesis. The handling of the interview material follows the research ethics guidelines and data protection principles established by Lund University. The study also aims to represent the respondents' opinions accurately and responsibly, and to avoid selective interpretation or misrepresentation of their statements.

5 Results

This chapter presents the empirical findings of the study in direct relation to the three research questions. It outlines the main patterns identified in the interview material and shows how these are supported and contextualised through the document and policy analysis. The chapter is structured around the three research questions and their associated thematic subsections to provide a clear and systematic presentation of the results.

5.1 Introduction

This chapter presents the results in direct relation to the three research questions of the study. The results are mainly based on the semi-structured interviews, which constitute the main empirical material of the study. Where relevant, the interview results are supported and contextualized through the document and policy analysis to strengthen the empirical interpretation and place the results within the Swedish regulatory context of the revised Energy Efficiency Directive.

The chapter begins with a brief overview of the empirical material. The results are then presented in three main sections, each corresponding to one of the research questions. Within each section, the results are organized into thematic subsections that reflect the main patterns identified in the interview material. This structure was chosen to maintain a clear and direct connection between the empirical results, the research questions and the overall purpose of the study. Although the chapter is not organized according to the theoretical frameworks, recurring patterns in the material are interpreted considering the four theoretical perspectives introduced earlier.

The purpose of the chapter is thus to present the empirical results systematically and transparently and to show how they contribute to answering the purpose of the study.

5.2 Overview of the Empirical Material

The empirical material presented in this chapter is based on six semi-structured interviews with respondents from two stakeholder groups. One group consists of representatives from Swedish real estate companies and the other of representatives from Boverket. This composition makes it possible to include both the perspective of stakeholders who are expected to react to the revised EPBD in practice and the perspective of stakeholders involved in its national interpretation and implementation.

The corporate respondents have strategic roles related to energy, sustainability and long-term renovation planning within organisations that manage large housing portfolios. Their interviews, therefore, provide insight into how regulatory developments are assessed in relation to portfolio-level priorities and investment decisions. The respondents from Boverket contribute perspectives on how the directive is interpreted, translated into the Swedish context and communicated to the market. The empirical material should thus be understood as reflecting strategic and institutionally informed perspectives rather than detailed experiences at the project level or from technical implementation.

To ensure consistency throughout the results chapter, interviewees are presented as "respondents", and when necessary, with their number 1-6. Organisational affiliation and professional role may be specified where its particularly relevant to the interpretation of a statement or quotation. This approach is used to maintain clarity and readability while preserving transparency regarding the empirical basis of the results.

5.3 Research Question 1

This section presents the results for research question 1:

How does the EPBD influence Swedish real estate companies' investment decisions in energy efficiency measures when renovating residential buildings in energy classes F and G?

The results are organized into four related areas: the perceived importance of the directive for housing portfolios, its effects on investment criteria and capital allocation, the timing of investments under regulatory uncertainty, and the broader institutional pressures influencing strategic decisions. Together, these results show that the EPBD is interpreted not only as a regulatory development, but also as a factor that shapes financial and organisational decision-making in practice.

5.3.1 Perceived Significance of EPBD for the Residential Portfolio

Across the interviews, the revised EPBD was generally not described as having triggered a fully developed new investment strategy for residential portfolios. At the current stage, most respondents instead presented the directive as an emerging regulatory condition that must be monitored and gradually integrated into existing decision-making structures. In practice, this means that firms still primarily rely on their internal sustainability targets, return requirements, and maintenance planning when prioritising investments, rather than working with a clearly defined EPBD-specific strategy.

This indicates that the perceived significance of the directive is, at present, more gradual than transformative. Several respondents described their organisations as already working with energy efficiency improvements through established internal goals and portfolio management routines. In this sense, the EPBD was often viewed less as a completely new strategic logic and more as a factor that may reinforce an ongoing development. At the same time, the interviews suggest that the directive has increased awareness of how low-performing buildings may become more exposed in the future, particularly as implementation becomes more concrete.

A recurring pattern was that the practical significance of the EPBD was overshadowed by an already existing portfolio strategy. Respondents described how strategic prioritisation continues to be shaped by expected returns, maintenance needs, building type, geographical location and organisational capacity. Energy performance is therefore only one of several dimensions that influence resource allocation. For this reason, low-performing buildings are not automatically prioritised first, even if they are recognised as relevant in relation to future EPBD requirements. In many cases, they are instead assessed in combination with whether renovation is already needed, whether the technical conditions are favourable and whether the investment can be justified within existing portfolio criteria.

At the same time, the material suggests that the directive is beginning to change how parts of the building stock are viewed. Some respondents described a growing need to identify and systematically monitor buildings with weaker energy performance, suggesting that the EPBD's importance is increasing, even if it has not yet led to a complete strategic shift. This interpretation is reinforced by the regulatory perspective, where respondents from Boverket (respondent 4 and 6) emphasised that the implementation is designed to meet EU requirements while limiting unnecessary market disruptions. Overall, the results suggest that the revised EPBD is currently perceived more as a reinforcing external pressure than as a comprehensive strategic driver, but that its importance is likely to increase as the Swedish implementation becomes clearer.

5.3.2 Effects on Investment Criteria and Capital Allocation

The interviews indicate that energy efficiency investments are still evaluated mainly on the basis of expected return and financial performance. Respondents consistently described return on investment requirements, payback periods and internal investment models as the central basis for deciding whether to implement an energy efficiency measure. In this sense, the EPBD does not appear to replace existing economic decision-making criteria. Rather, its influence is filtered through them. Energy efficiency measures are generally pursued up to the point where further improvements are no longer considered sufficiently profitable.

Several respondents from the real estate companies described well-structured internal models in their respective organizations for evaluating investments. These models differed somewhat in form, but the underlying logic was similar: projects must meet defined return requirements to compete for capital. Although the specific financial metrics varied between companies, respondents generally described investment assessments in terms of profitability, payback time, or required return. The important point is therefore not the exact metric used, but that energy efficiency measures must be able to demonstrate sufficient financial performance in order to compete with other investment priorities. On the contrary, they are assessed within the same economic framework as other capital-intensive measures. One respondent described this logic in particularly direct terms: if the required return cannot be achieved, the investment is not made. At the same time, a recurring theme shows that companies rarely evaluate individual measures in isolation. A recurring approach was instead to package more and less profitable measures together to achieve an acceptable total return for the project as a whole. This was often linked to broader renovation cycles or maintenance needs. Investments in energy efficiency are therefore more likely when they can be integrated with already necessary measures, such as system replacements or larger renovation projects. In practice, this means that capital allocation is often based on the economics of packaged measures rather than on the profitability of each energy measure separately.

The findings also suggest that EPBD is starting to influence prioritisation criteria, although it has not yet fundamentally changed companies' return requirements. Several respondents described a growing need to pay greater attention to low-performing buildings and to assess where future regulatory pressure is likely to be greatest. This does not mean that such buildings are automatically prioritised, but it does seem to make them more visible in portfolio-level planning. In some cases, respondents also described a broader value logic emerging around energy performance, where the economic argument is no longer based solely on direct energy savings. Instead, factors such as carbon targets, access to preferential financing and the strategic value of improving building performance are becoming more relevant in capital allocation decisions. However, there seems to be a clear limit to this shift, in the housing context, respondents stressed that investment costs cannot be easily passed on to tenants, making the economic argument particularly important. As a result, strict return limits remain crucial even when improvements in energy performance are strategically desirable. Some respondents described a willingness to accept slightly lower returns when investments contribute to broader climate goals, but this did not appear to represent a complete departure from profitability-based decision-making.

Another important finding concerns external financing conditions. Real estate respondents and regulatory actors pointed to regional differences in property values and credit conditions, which can significantly affect the ability to implement otherwise profitable investments. In stronger property markets, profitable measures are easier to finance. In weaker markets, however, low asset values can make it difficult to secure loans even when an investment seems reasonable in theory. Some respondents also noted that banks do not always share the property owner's assessment of what constitutes a profitable energy efficiency measure. This creates a gap between internal investment logic and actual access to capital.

The results show that the EPBD affects investment criteria and capital allocation mainly by increasing the strategic relevance of energy performance within existing financial frameworks. It is starting to influence which assets are prioritised and how future renovation needs are assessed, but investment decisions continue to be driven by return requirements, financing conditions and competition with other capital needs. The directive, therefore, appears to reshape priorities at the margin, rather than shifting the underlying economic logic behind investment decisions.

5.3.3 Investment Timing under Regulatory Uncertainty

A clear pattern across the interviews was that uncertainty regarding the Swedish implementation of the revised EPBD affects the timing of investment decisions. Respondents did not generally question the need for energy efficiency investments as such. Instead, uncertainty was described as influencing when larger renovation measures are considered reasonable, how quickly firms are willing to act, and whether investments are undertaken immediately or in stages. Several respondents linked this uncertainty to the difficulty of assessing what future national requirements will mean in practice. A respondent from Boverket emphasised that the directive covers many different aspects of buildings and property management, which makes it difficult for property owners to determine what level they will ultimately be expected to achieve and how different requirements relate to one another. This creates a timing problem in cases involving larger capital commitments, where firms risk investing now only to find that further measures are required once the Swedish framework becomes clearer. As one respondent from Boverket explained, "If one is facing larger investments, it can be risky to carry them out now if there is a possibility that additional investments will be required in one or two years in order to meet new requirements."

The findings suggest that this uncertainty tends to encourage caution rather than immediate acceleration. Respondents described a tendency to prioritise measures that are already urgent or clearly necessary, while more strategic and capital-intensive investments may be postponed until the regulatory environment becomes more predictable. In this sense, uncertainty does not necessarily reduce willingness to invest, but it can delay the point at which larger interventions are considered justified. At the same time, the interviews do not indicate a uniform strategy of waiting. A more nuanced picture emerges in which firms attempt to manage uncertainty in different ways. Some respondents pointed to hesitation within the sector, while others emphasised the importance of beginning necessary work early to reduce future risk. A respondent involved in the implementation of EPBD at Boverket noted that the authority receives questions about whether it is advisable to wait, which suggests a certain degree of caution in the industry. At the same time, the respondent stressed that Boverket's message has been that firms do not lose by undertaking necessary measures now, even if some actors may still choose to delay.

Another recurring theme was the preference for flexibility in planning. Rather than committing immediately to major and potentially irreversible investments, respondents described a tendency to keep options open through staged measures or postponed decisions. This reflects an effort to avoid locking in capital too early under conditions where future requirements, implementation details, and possible support mechanisms remain uncertain. One respondent described the policy environment as marked by shifting and fragmented signals, arguing that this type of fluctuation creates administrative difficulties and increases uncertainty, which creates a need for clearer and more long-term rules of the game.

Some respondents also linked investment timing to the possible introduction of future incentives or support mechanisms. This suggests that firms are not only waiting for clearer regulatory requirements but may also be considering whether improved financial conditions for compliance could emerge later. Uncertainty, therefore, appears to affect both the regulatory and economic timing of decisions. The findings show that regulatory uncertainty influences investment timing in a systematic way. The revised EPBD does not appear to reduce the perceived need for energy efficiency measures, but it

does affect when firms consider larger investments to be reasonable. In practice, this favours caution, flexibility, and staged planning over immediate large-scale commitments.

5.3.4 Institutional Pressures and Strategic Positioning

The results suggest that Swedish real estate companies generally adjust their strategies when regulatory requirements become clear, but that the incomplete implementation of the EPBD has so far limited the scope for direct strategic change. Respondents did not describe the directive as having already led to a fully established shift in investment strategy across the sector. Instead, its influence appears to be conditional: companies follow regulatory changes closely and expect to adapt, but many remain cautious until the Swedish rules are more clearly defined.

A recurring pattern in the interviews was that companies are very receptive to binding regulation, but less willing to reorganise their strategies around expected requirements that are still uncertain. In this sense, the EPBD is already influencing strategic attention, but not yet with the same force as a fully operational framework. Several respondents described the current situation as one where companies recognise that regulatory pressure is increasing but still lack sufficient clarity to translate the directive into actions that cover the entire company portfolio. This means that the EPBD is starting to shape strategic thinking, but often more as a factor to monitor and prepare for than as a set of rules that already determines decisions. At the same time, the material suggests that some companies have started to reposition themselves for future requirements. This was evident in how respondents described a growing internal focus on low-performing buildings, particularly those in the lower energy classes. While most companies had not developed a separate EPBD strategy, some had started to identify vulnerable buildings more systematically and incorporate EPBD-related considerations into their strategy. This points to an early stage of strategic adaptation, where the directive is not yet decisive in itself, but is starting to influence how parts of the housing stock are assessed.

The interviews also show that the strongest regulatory effects on strategic behaviour currently come from frameworks that are already clear, measurable and linked to market consequences. In particular, the EU taxonomy was described as having a stronger immediate influence on investment priorities. Where energy efficiency improvements can move a building below a recognised threshold, this can improve financing conditions and increase market attractiveness. In such cases, regulation influences strategy not only through compliance with laws but also through competitiveness, legitimacy and access to capital. This suggests that companies react most strongly where regulatory changes are translated into concrete economic and market signals. Respondents described that, depending on how detailed the regulatory rules are, they have different levels of impact. Thresholds, classifications and technical rules can significantly shape internal strategy. For example, by encouraging optimisation around specific benchmarks rather than broader improvements in energy performance. This also indicates that energy classification may become relevant beyond buildings currently assigned to the lowest classes. If national classification thresholds are recalibrated as part of the Swedish implementation of the revised EPBD, buildings that currently appear to perform acceptably may become more strategically exposed in the future. From a portfolio perspective, this could make energy efficiency improvements in buildings outside classes F and G relevant as a preventive strategy, not necessarily because they are the most urgent assets today, but because companies may seek to reduce the risk that a larger share of the portfolio is later classified as low performing.

Swedish property companies are not indifferent to the EPBD, but they have not completely reoriented their strategies around it either. At present, the directive seems to influence strategic thinking mainly by increasing attention to low-performing buildings and by signalling the direction of future regulation. The strongest strategic reactions emerge where regulatory changes are sufficiently clear to affect funding, competitiveness or legitimacy in the market.

5.4 Research Question 2

This section presents the results for research question 2:

Which energy efficiency measures or packages of measures appear most relevant for complying with the EPBD requirements in a Swedish context?

The results are organised into four related areas: the individual measures most often prioritised by respondents, the preferred packages of measures and system solutions, the conditions that shape the relevance of the measures in the Swedish housing context, and the practical evaluation and prioritisation of measures during implementation. Together, these results show that the relevance of energy efficiency measures is not determined by a single technical logic, but by how specific interventions are assessed in relation to building conditions, economic feasibility, and practical renovation possibilities.

5.4.1 Most Frequently Prioritised Individual Measures

The empirical material shows that the individual measures that are consistently prioritised in older residential buildings are operational optimisation, ventilation upgrades and, in more technically demanding cases, roof and facade improvements. These measures are relevant in relation to the EPBD because they directly target the energy performance of existing buildings, which is central to the Directive's objective of reducing the average primary energy use of the residential building stock. In this sense, they represent practical ways in which real estate companies may respond to EPBD-related requirements without necessarily relying on complete or highly intrusive renovation. They recur in the interviews not because they are equally appropriate in all buildings, but because they represent the interventions that are most often seen as both relevant and technically feasible in relation to the condition of the existing stock. Energy operational optimisation was described as the most accessible and least demanding measure. Several respondents emphasised that significant savings can sometimes be achieved simply by improving the performance of existing systems through adjustment, control and better management, rather than through major new installations. This type of measure was presented as particularly relevant where current systems are not working effectively and where more extensive interventions would be difficult to justify.

Ventilation-related measures were also repeatedly highlighted as one of the most important technical areas for improving energy performance. In particular, respondents referred to upgrading buildings with self-draft systems or simple exhaust ventilation to more modern systems with heat recovery, especially FTX (mechanical ventilation with heat recovery). These measures were described as highly relevant in many low-performing buildings, but also as more technically demanding than operational optimisation, as older buildings are often not physically prepared for new ducts, units and other installations.

In the oldest and weakest performing buildings, respondents more often pointed to roof and facade measures as necessary individual measures. These were mainly described in cases where the building envelope is so poor that improvements to the building's technical systems, such as operational optimisation, control adjustments, ventilation upgrades or heating system improvements, would not be sufficient on their own. At the same time, such measures were presented as more extensive and more difficult to implement, both technically and economically, especially in buildings where modern energy solutions are difficult to integrate without broader renovation. This suggests that the most prioritised measures are those that offer a realistic balance between technical effect and practical feasibility. Operational optimisation seems to be the easiest starting point, ventilation upgrades are the most frequently highlighted system measure, and roof and facade measures are the most important individual measures in buildings where lighter measures are insufficient.

5.4.2 Preferred Packages of Measures and System Solutions

The interviews show that companies generally do not consider energy efficiency improvements as a set of isolated measures, but as combinations of efforts that need to be coordinated to be both technically meaningful and economically sustainable. A consistent finding in the material is that respondents prefer packaged renovation strategies where several measures are implemented together, especially when this improves overall profitability, reduces repeated disruptions to tenants and enables greater energy savings. In this sense, this logic was often described not only as beneficial but also as necessary to achieve more significant improvements in poorer energy-performing residential buildings.

Three recurring packages of measures can be identified in the empirical material. First, respondents described packages where more and less profitable measures are combined within the same project. Rather than requiring each measure to meet yield thresholds on its own, companies assess the package as a whole. This makes it possible to include technically necessary but less profitable energy measures when combined with measures that are already required or are economically stronger.

Second, respondents repeatedly linked energy efficiency packages to larger renovation windows and maintenance cycles. Measures were described as most relevant when they can be integrated into works that would still need to be carried out, such as facade renovation, roof replacement or replacement of technical systems. In these cases, companies preferred broader efforts to separate small-scale upgrades, as this both lowers the overall implementation cost and reduces disruption for tenants.

Third, the interviews point to recurring technical system combinations, particularly in older and lower-performing buildings. In these cases, respondents often described the building envelope as a necessary starting point where thermal performance is poor, meaning that façade and roof measures may need to precede or accompany system upgrades. Ventilation improvements were also highlighted as part of wider system solutions, particularly where older self-priming or simple exhaust air systems are replaced with more modern systems with heat recovery. In somewhat larger residential buildings, these packages may also include exhaust air heat pumps in conjunction with the replacement of older fans or related equipment.

At the same time, interventions such as energy operation optimisation were not described as separate from this logic, but often as part of a broader package. Such measures can either serve as a first step or complement more thorough technical interventions. Overall, the results suggest that the most relevant renovation packages are not standardised in a fixed form. Instead, they are shaped by a recurring logic that combines climate shell measures, ventilation upgrades, heating-related interventions and operational improvements in ways that suit the technical condition of the building and the timing of planned renovation work.

5.4.3 Conditions Shaping Measure Relevance in Swedish Context

The interviews show that the relevance of specific energy efficiency measures in Swedish residential buildings strongly depends on the context in which they are evaluated. Respondents did not describe any single set of measures that are broadly applicable across the entire housing stock. Instead, the measurement of relevance was presented as dependent on a combination of building-specific and market-specific conditions, including building size, existing system configuration, local energy infrastructure, property value and the economic conditions of the local housing market. A recurring pattern was that the same measure may be considered realistic in one building but not in another, even within the same portfolio. Larger buildings were often described as easier to justify economically, while smaller and weaker buildings were more likely to face both technical and economic constraints. This was particularly important in relation to buildings in energy classes F and G, which were often described as the most relevant from a regulatory perspective, but also as among

the most difficult assets to improve cost-effectively and practically. The findings also suggest that the Swedish context matters through its existing heating systems and local infrastructure. In residential buildings connected to district heating, some technically feasible measures may be considered less appropriate when assessed against broader system conditions. Respondents also pointed to differences between stronger and weaker housing markets, where access to financing and the possibility of justifying larger interventions vary significantly.

The material also shows that the buildings that are most relevant from an EPBD perspective are often the ones that are most difficult to improve in practice. Several respondents described low-performing buildings in energy classes F and G as technically limited and difficult to upgrade cost-effectively. This creates an important tension: the buildings that are most exposed to future regulatory expectations are often those with the weakest practical conditions for energy efficiency improvement. The relevance of the measure therefore depends not only on the theoretical savings potential, but also on whether the building can handle the intervention without disproportionate technical or financial efforts.

Another recurring issue was the size of the building. Larger residential buildings were generally described as easier to justify economically, as technical upgrades can be spread across more apartments and often fit more easily into the building. Smaller buildings, on the other hand, were more often described as difficult cases, especially when poor energy performance is combined with limited technical space and weak project economics. Further, multiple respondents suggest that existing heating systems and local energy infrastructure also affect the relevance of measures. In buildings connected to district heating, some technically feasible solutions may be seen as less attractive from a broader system perspective, even if they reduce purchased energy at the building level. This is because Swedish district heating systems are often already relatively energy-efficient and based on low-carbon energy sources, meaning that further reductions in building heat demand do not always translate into equally large system-level energy or climate benefits. Respondents thus indicated that the suitability of a measure is not only influenced by the building itself, but also by how it fits into local energy conditions.

Finally, the property market was described as a decisive factor. In stronger housing markets, higher asset values make it easier to finance relevant measures. In weaker markets, even buildings with clear renovation needs may remain difficult to manage because financing conditions are too weak. The results show that the relevance of energy efficiency measures in Swedish residential buildings is strongly context dependent. Age, condition, size, heating context and market conditions all shape which measures are considered realistic and valuable.

5.4.4 Evaluation and Prioritisation of Measures in Practice

The interviews suggest that energy efficiency measures are not primarily prioritized as isolated technical options, but as interventions that become realistic only when they can be implemented in the right building, at the right time and in the right order. In practice, respondents described prioritization as a process of matching energy-related needs with maintenance cycles, technical possibilities and broader renovation plans. This means that a relevant measure can still be postponed if the practical conditions for implementation are not yet in place.

A recurring finding was that companies rely on structured internal methods to support this process. Respondents referred to energy performance certificates, internal calculation models, energy programmes and long-term planning tools as ways to identify buildings with weaker performance and compare future options across the portfolio. These tools may also support a more preventive form of prioritisation. While the empirical focus of this study is on buildings in energy classes F and G, portfolio-level planning can also include buildings with somewhat higher energy performance if they are considered at risk of becoming strategically weaker under future classification rules or market

expectations. In this sense, energy efficiency measures in buildings currently outside the lowest classes may still be relevant as part of a broader portfolio strategy to avoid future regulatory or financial exposure. These tools were also described as important for assessing how different measures affect energy performance over time, but also for determining which measures are most realistic to take first. The empirical material, therefore, suggests that evaluation in practice is not only about choosing the best measure in principle, but also about identifying where and when a measure can be implemented effectively.

Sequencing emerged as a particularly important aspect of this logic. Respondents from the real-estate side repeatedly described energy efficiency measures as being most feasible when they could be coordinated with necessary maintenance. This was seen as important to avoid duplication of effort, reduce unnecessary costs and limit disruption to tenants. In this sense, sequencing was presented as a practical condition for implementation rather than simply a matter of scheduling.

The results also show that buildings with poor energy performance are not always addressed first, even when they are clearly relevant from an EPBD perspective. Instead, companies seem to prioritise where building needs, technical feasibility and timescales match. A building with lower energy performance may therefore remain lower on the implementation list if the necessary measures are too fragmented, too difficult to integrate or too poorly timed in relation to the building's renovation cycle. Therefore, measures may be implemented earlier in buildings where the technical and practical conditions are already favourable. Overall, the results suggest that energy efficiency measures become realistic when they can be introduced as part of a logical work sequence that fits the technical condition of the building, avoids duplication of work, and is consistent with planned renovation activity.

5.5 Research Question 3

This section presents the results for research question 3:

How do different thresholds shape Swedish real estate companies' perceptions of when additional energy efficiency measures become less feasible or cost-effective under the requirements of the EPBD?

The results are organized into four related areas: the economic thresholds at which further measures are perceived as less attractive, the technical and building-specific thresholds that limit what is considered feasible, the strategic thresholds shaped by regulatory uncertainty, and a final synthesis of the perceived boundaries between cost-effective and non-cost-effective renovation. Together, these results show that perceptions of thresholds are not defined by a single cost estimate, but by the interplay of economic viability, building-specific constraints, and uncertainty about the level of action that is reasonable under the ever-changing EPBD framework.

5.5.1 Economic Thresholds

The clearest threshold identified in the interviews was the economic one. Throughout the material, respondents described further energy efficiency measures as acceptable only to the extent that they are still economically justified within the framework of normal investment logic. When the expected return falls short of internal requirements or when the cost of further improvements becomes too high in relation to the expected benefit, the business case is significantly weakened. In this sense, the perceived limit of cost-effective renovation was described not as a fixed technical point, but as the point at which further measures no longer meet the economic conditions required for implementation.

A recurring pattern was that profitability was the first economic threshold. Measures were generally described as feasible only if they could meet the return requirements or be recovered within a reasonable payback period. One respondent (number 1) summed up this logic in straightforward terms: "if the measure does not generate an acceptable return, it is not implemented". This indicates that the threshold is not reached only when a measure becomes loss-making in the narrow sense, but already when it falls below the return expectations that in practice guide capital allocation. Respondents from the real-estate side also described this threshold as moving over time, as future energy prices strongly influence how much additional energy efficiency improvements can be economically justified. If energy prices remain high, deeper renovations can be justified for a longer period. If they stabilize at lower levels, the threshold is reached earlier.

The interviews also show that a second economic threshold arises when the most profitable measures have already been implemented. Several respondents from the real-estate side described a clear pattern of diminishing returns, where the "low-hanging fruit" can often be addressed within existing investment criteria, while the next step requires much heavier efforts with weaker profitability. In practice, this means that the first improvements can still be accommodated within the business model, while it becomes increasingly difficult to justify continuing to operate a building, for example through more extensive facade, roof or system interventions. This logic was particularly clear in relation to older residential buildings in energy classes F and G, where the entry cost for meaningful improvements can be very high from the start. Several respondents described such buildings as the most relevant from a regulatory perspective, but at the same time the least attractive from an economic perspective.

A third financial threshold concerns financing rather than profitability per se. The interviews suggest that a measure may be economically reasonable in theory, but still impossible to implement if financing cannot be secured. Respondents from both the property sector and the Swedish National Board of Housing, Building and Planning (Boverket) pointed to cases where banks do not share the owner's assessment of the long-term potential of an investment. As one respondent from the Swedish National Board of Housing, Building and Planning explained, an energy efficiency measure may be profitable in theory, but the owner may still not be able to obtain a loan if the property value is too low to provide sufficient collateral. This financing gap was described as particularly relevant in weaker housing markets, where low-performing buildings may also be those with the weakest asset values. In such cases, the threshold is not only whether an investment pays off over time, but whether it can be financed at all.

Related to this, respondents also pointed to a fourth economic limit linked to cost recovery and portfolio strategy. In some locations, major investments may require rent increases that are not feasible in the local market. This means that even if a renovation could improve the performance of the building, the revenue conditions needed to support the investment may not be in place. At the same time, respondents noted that since the EPBD for residential buildings is framed around average performance at the stock level, some individual buildings may in practice remain at a lower level if the portfolio as a whole performs adequately. This introduces a threshold at the portfolio level: companies may judge that it is economically rational to stop at a certain point in a building and instead allocate resources elsewhere in the stock. This portfolio logic was also visible in cases where measures were considered valuable, not because they maximised energy savings per SEK invested, but because they were sufficient to move a building below a specific benchmark or threshold. Beyond that point, the additional economic benefit was perceived to diminish rapidly. In contrast, some very weak assets were described as so difficult to improve profitably that the relevant question became whether they should continue to be managed at all. For portfolios with a significant proportion of class F and G buildings, respondents suggested that the very scale of the transition may become an economic threshold.

Overall, the results show that the perceived economic threshold for further renovation operates at three closely linked levels: the profitability of the individual measure, the ability to finance the

investment, and the portfolio-level assessment of where further capital allocation is still reasonable. Further energy efficiency measures were generally considered justified only as long as they meet the return requirements, can be financed in practice and remain strategically justifiable within the wider housing portfolio. Beyond that point, further renovation is perceived as progressively less cost-effective and more difficult to justify.

5.5.2 Technical and Building-Specific Thresholds

The interviews point to a second type of threshold that is rooted in the physical and technical limitations of the building itself. Respondents described a point at which further energy efficiency improvements are no longer perceived as a matter of adding another reasonable measure, but of moving to interventions that are too extensive, intrusive or difficult to justify in relation to the specific asset. In this sense, the threshold is reached when the next step requires a disproportionate increase in the depth of intervention rather than a proportional improvement in the building's performance.

A recurring finding was that the buildings that are most relevant from an EPBD perspective are often also the most difficult to improve in practice. Several respondents described buildings in energy classes F and G as the clearest examples of this pattern. These buildings may have weak shells, limited installation space, outdated technical systems or structural conditions that make modern solutions difficult to integrate. As a result, the threshold is often not reached because no further action is conceivable in theory, but because the actions that remain would require a fundamentally different scale of effort.

This was particularly evident in older residential buildings where easier improvements have already been exhausted or are insufficient on their own. Respondents suggested that once more accessible measures have been taken, the remaining options often involve major work on the building structure, such as extensive façade or roof renovations or significant retrofitting to adapt to modern ventilation or heating systems. At that point, further efficiency gains are no longer seen as a continuation of regular upgrading, but as a move to technically burdensome renovation.

The results also suggest that some buildings face more absolute technical constraints. One respondent noted that some features will always be difficult to improve, for example, where heritage values limit what can be changed. In such cases, the threshold is sharper: not only is further action less attractive, but the scope for action is directly limited by the nature of the building. This means that standard renovation logics cannot only be extended to all assets, but also when energy performance is poor. Overall, the results show that technical and building-specific thresholds arise when further energy efficiency improvements gains require efforts that are no longer proportionate to the physical conditions of the building. These thresholds are particularly visible in older and low-performing residential buildings, where the need for improvements is high but the technical capacity for further changes is often limited.

5.5.3 Strategic Thresholds under Uncertainty

The interviews indicate that a third type of threshold arises from uncertainty about what level of action is strategically reasonable at the current stage. Unlike the economic threshold, which is about whether an action can be justified economically, or the technical threshold, which is about what the building can physically absorb, this threshold arises when companies no longer know what level of ambition it is rational to commit to before the future regulatory framework is sufficiently clear. Respondents described this as a question of timing, flexibility and strategic exposure rather than just direct profitability.

A recurring finding was that unclear and still changing requirements make long-term planning more difficult. Several respondents stressed the need for a clearer picture of what will be introduced over the next five to ten years before major renovation decisions are made. In this sense, the threshold is reached when the uncertainty about future regulations becomes sufficiently great that companies no longer see it as reasonable to continue to deepen their investment plans based solely on current assumptions. This was particularly clear in relation to the interpretation of what future compliance might actually require. An important point raised in the interviews was the uncertainty about the meaning of zero-emission building requirements for existing buildings. As one respondent from the Swedish National Board of Housing, Building and Planning noted, for an existing building, this may only mean that the practically feasible measures have been implemented, but this interpretation was described as creating confusion rather than clarity. The result is that companies are not only asking what measures are possible, but also how far they are expected to go before the regulatory goal can be considered fulfilled. This creates a strategic threshold as the appropriate stopping point remains unclear.

The material also suggests that uncertainty affects how companies select, postpone or exclude measures in practice. Rather than immediately committing to greater and more irreversible efforts, respondents described a tendency to preserve room for manoeuvre until future requirements become clearer. This may mean favouring smaller optimisation measures, postponing more extensive renovation steps or actively avoiding solutions that risk proving to be wrong in relation to future regulations, incentives or market conditions. In this sense, flexibility has a value in itself and the threshold is reached when it becomes strategically preferable to wait or to choose narrower measures rather than committing too early. A related pattern was that uncertainty about future support systems or other incentives could affect the pace of investment. Some companies indicated that the possible emergence of investment support could affect whether larger measures are taken now or later. The strategic threshold is therefore not only linked to uncertainty about legal requirements but also to uncertainty about the wider political environment surrounding implementation.

Uncertainty can affect portfolio strategy more fundamentally. Some respondents suggested that if clear penalties or similar sanctions were introduced for owning buildings in lower-performing energy classes, some companies might choose to divest such assets rather than undertake renovations that would be considered structurally unprofitable. This indicates that uncertainty not only shapes the sequencing of actions but can also change the boundary between renovation, postponement, selective optimisation, and divestment. This suggests that strategic thresholds under uncertainty arise when companies can no longer determine what constitutes the right level of action within the ever-changing EPBD framework. At that point, the key question is not just whether more can be done, but whether it is rational to go further before the regulatory direction, support conditions, and practical interpretation of future requirements are sufficiently clear.

5.5.4 Synthesis of Perceived Thresholds for Further Renovation

The interviews suggest that the perceived threshold for cost-effective renovation is not defined by a single cut-off point, but by the interplay of three broader threshold categories: an economic threshold, a technical and building-specific threshold, and a strategic threshold under uncertainty. These thresholds are fundamentally different, but in practice they often reinforce each other, especially in residential buildings with low energy performance.

The first and most consistently expressed limit is economic. Further renovations are generally seen as justified only as long as the measures remain profitable, financeable and reasonable within the framework of a broader portfolio prioritisation. The threshold is reached when further measures no longer meet internal rate of return requirements, when marginal gains become too small in relation to the required investment, or when financing cannot be secured despite theoretical profitability. This limit was particularly visible in relation to buildings in energy classes F and G, where the cost of

reaching a higher level of performance can quickly exceed what companies consider to be economically justifiable.

The second limit is technical and building specific. Here, the threshold is reached when further improvements would require interventions that are no longer proportionate to the physical conditions of the asset. Respondents described this particularly in relation to older buildings with weak shells, outdated systems, limited installation space or heritage-related constraints. In such cases, the question is no longer just how much more energy can be saved, but whether the next step would require a scale of intervention that is too intrusive or too poorly adapted to the building itself.

The third boundary is strategic and shaped by uncertainty. Respondents described a point where it becomes unclear what level of action is rational to undertake within the ever-evolving EPBD framework. This was particularly evident in the interpretation of what a net-zero emissions status for existing buildings might entail. As emerged in the interviews, one interpretation is that an existing building can be compliant once the measures that are practically feasible have been implemented. At the same time, respondents described this interpretation as creating uncertainty rather than reducing it, as it leaves open how far a building owner is expected to go before the requirement can be considered to be met. This ambiguity is important because it affects where companies perceive the stopping point. In such circumstances, some companies may postpone major efforts, rely on limited optimisation measures or maintain flexibility until the regulatory direction becomes clearer. The empirical material, therefore, suggests that the threshold for cost-effective renovation under the EPBD is not solely determined by the technical potential, but by how these three threshold categories meet in practice.

6 Discussion

This chapter discusses the empirical findings in relation to the theoretical framework and previous research. The discussion is structured according to the four theoretical perspectives presented in the study to analyse how the revised EPBD may influence investment behaviour and renovation strategies in the real estate sector. The chapter concludes by synthesising the key insights and outlining their implications for renovation planning under the revised regulatory framework.

6.1 Overview of key findings

The findings show that the revised EPBD influences investment decisions in Swedish real estate companies primarily by increasing the strategic importance of low-performing residential buildings, rather than by replacing existing financial and organisational decision logics. The results further indicate that the relevance of energy efficiency measures depends on building-specific, economic and practical conditions, while the perceived limit for further renovation is determined jointly by economic, technical and strategic thresholds. These important results form the basis for the following discussion, where the results are interpreted based on the theoretical framework of the study.

6.2 Energy-efficiency gap and investment barriers [A]

The findings suggest that the revised EPBD does not remove the underlying barriers to energy efficiency investment, but rather makes them more visible and, in some cases, more pressing. A central result of the study is that Swedish real estate companies continue to evaluate energy efficiency measures through established financial and organisational decision logics, even when the directive increases the strategic relevance of low-performing buildings. This supports the core argument in the energy-efficiency gap literature that the existence of technical saving potential does not automatically translate into implementation, since investment decisions are shaped by a wider set of constraints than engineering calculations alone (Allcott & Greenstone, 2012; Jaffe & Stavins, 1994).

The results also indicate that the EPBD mainly interacts with an already existing gap between technically viable measures and measures that are perceived as realistic in practice. In the interviews, this gap appeared not only as a matter of direct profitability, but also in relation to hidden costs, internal routines, limited organisational capacity, and the need to align energy measures with broader renovation cycles. This is highly consistent with barrier-oriented interpretations of the energy-efficiency gap, where transaction costs, coordination costs, and internal time requirements can make apparently cost-effective measures unattractive in practice (Jaffe & Stavins, 1994). It also aligns with Swedish findings showing that transaction costs may be a central explanation for limited renovation action, even where energy savings are technically achievable (Lundmark, 2024).

A further important aspect is that information alone does not seem sufficient to close this gap. Although the results show that companies increasingly use energy declarations, internal models, and more structured portfolio data to identify low-performing assets and evaluate future measures, this did not appear to eliminate uncertainty or fundamentally change investment behaviour. This corresponds well to previous Swedish research on energy performance certificates, which suggests that information tools may support some targeted action, but rarely remove deeper investment barriers on their own (Broberg et al., 2019; Pasichnyi et al., 2019). In the present study, the relevance of better data was clear, but its practical effect remained dependent on whether companies could integrate that information into financially and organisationally possible projects.

Additionally, the findings reveal that strict return requirements and internal investment thresholds function as an important mechanism through which the energy-efficiency gap is reproduced. Companies did not reject energy efficiency measures as such, but they often applied hurdle rates, payback expectations, and portfolio prioritisation logics that filtered out measures with longer or more uncertain returns. Therefore, the results resemble the literature on implicit discount rates and bounded rationality, where organisations rely on simplified decision rules that may lead to underinvestment even when future savings appear substantial (Allcott & Greenstone, 2012; Schleich et al., 2016). The study therefore supports the view that the gap is not only explained by missing information or weak incentives, but also by organisational routines and investment approaches that favour shorter-term and more controllable returns.

Simultaneously, these observations create a new perspective on the energy-efficiency gap. The interviews show that some of the least renovated buildings, particularly assets in energy classes F and G, are also those with the weakest technical and economic conditions for improvement. This means that underinvestment cannot automatically be interpreted as inefficiency. In line with Jaffe and Stavins (1994) and Allcott and Greenstone (2012), the findings suggest that part of the observed gap reflects rational responses to real constraints rather than a simple failure to exploit "win-win" opportunities. In this study, the EPBD appears to confront precisely those parts of the housing stock where the distance between technical potential and practically achievable renovation is greatest.

Overall, the result indicates that the revised EPBD may narrow some parts of the energy-efficiency gap by making low-performing buildings more visible and by increasing the regulatory relevance of energy performance. However, the study also shows that the directive does not in itself overcome the financial, informational, and organisational barriers that continue to shape renovation decisions. The energy-efficiency gap in this context should therefore be understood less as a single market failure and more as a layered set of investment barriers that continue even under stronger regulatory pressure.

6.3 Principal-agent problems and split incentives [B]

What stands out in the empirical material is that the landlord–tenant problem is present, but not in its most simplified form. The classic principal-agent argument is still highly relevant here: the actor expected to bear the cost of renovation does not always capture enough of the benefit to make deeper energy investments attractive. That basic mechanism is well established in the literature on split incentives in rental housing (Gerarden et al., 2015). At the same time, the interviews show that the Swedish residential context complicates this picture. Property owners are not entirely detached from the gains of energy efficiency measures, since they can often retain part of the value through lower operating costs, more stable asset performance, or portfolio-level improvements. The problem is therefore not the total absence of owner-side benefit, but that the distribution of cost and gain is still uneven enough to weaken the case for more ambitious renovation.

This becomes clearer when the findings are read against the Swedish rent context described in the theoretical framework. In many multifamily buildings, heating is bundled into rent, which means that the connection between energy savings, rent-setting, and cost recovery is less transparent than in settings where tenants directly face utility costs (von Platten et al., 2022). That matters because it shifts the split-incentive problem. It is no longer only about landlords paying while tenants save; it is also about landlords carrying a large part of the investment burden in a system where the route back to recovered value is uncertain, negotiated, and sometimes politically or socially sensitive. The interview material reflects exactly that tension. Energy renovation may be strategically justified, but once the measures become more extensive, the question of who can reasonably absorb the cost becomes much harder to resolve.

The theory section also emphasises that split incentives are sustained not only by divergent interests, but by information asymmetry and contractual structure (Melvin, 2018; Petrov & Ryan, 2021). That is strongly seen in the results. Several of the difficulties described by respondents were not limited to the investment itself but concerned the feasibility and acceptability of implementing it in occupied residential buildings. In that sense, the agency problem extends beyond energy bills. Tenant acceptance, renovation disruption, and limits to rent adjustment all affect whether a landlord sees a measure as realistic, even where the technical case exists. This gives the principal-agent framework more depth in the present study. It is not just a question of misaligned monetary incentives, but of how contracts, occupancy, and implementation conditions together shape the practical room for action.

The interviews also make it clear that these tensions intensify as renovation depth increases. Easier measures can often be absorbed within ordinary management or maintenance logic. Deeper interventions are different. Once renovation begins to involve major facade work, ventilation replacement, or other intrusive measures, the imbalance becomes sharper. The owner faces a larger upfront commitment, greater implementation risk, and weaker certainty about how much of that value can be retained. Meanwhile, the tenant side experiences a mixture of potential benefits, temporary burden, and possible rent effects. This fits well with von Platten et al. (2022), who show that smaller projects may be associated with cost relief, while larger retrofits can create heavier burdens, especially for more vulnerable households. It also helps explain why the split incentive in this study appears strongest precisely in the part of the housing stock where EPBD puts the most pressure: weaker-performing residential buildings requiring deeper renovation.

At the same time, the material does not support a reading in which split incentives alone explain the limited pace or depth of renovation. That would be too narrow. Several of the stopping points identified earlier in the results arise before landlord-tenant misalignment becomes the dominant issue. Profitability, building-specific constraints, and regulatory uncertainty all matter in their own right. What the principal-agent lens contributes is something more specific: it helps explain why even strategically relevant and technically reasonable measures can remain difficult to implement once costs, benefits, and disruption are distributed across different actors. In that respect, the framework is most useful not as a full explanation, but as one of the mechanisms that make deeper residential renovation hard to realise in practice.

Ástmarsson et al. (2013) argue that these kinds of dilemmas rarely disappear through a single instrument and instead often require some combination of contractual design, information, and organisational routines. That point resonates strongly with the study. Nothing in the interviews suggests that clearer information alone would solve the problem, or does it seem likely that regulation alone will eliminate it. The challenge is structural. For this reason, the study supports a broader interpretation of split incentives: one where the issue is not simply who pays and who saves, but how ownership arrangements, tenant relations, and cost-recovery mechanisms together shape the limits of energy renovation in Swedish rental housing.

6.4 Investment behaviour under regulatory uncertainty [C]

Few parts of the material were as consistent as this one. The companies did not describe the revised EPBD as something they opposed in principle, or as something they could simply ignore. What created hesitation was instead the difficulty of knowing how far it was sensible to go before the Swedish implementation had become clearer. That pattern fits well with real-options theory, where the central point is not that firms dislike investment, but that waiting can be rational when investments are partly irreversible and future conditions remain uncertain (Dixit & Pindyck, 1994). In the present study, that logic was visible in how respondents talked about timing, staging, and the value of not locking themselves in too early.

What makes this especially relevant in the EPBD context is that uncertainty does not concern only one variable. The interviews pointed to uncertainty about future requirements, future support schemes, the practical interpretation of compliance, and the pace of Swedish transposition. Under those conditions, investment behaviour becomes less about deciding whether a measure is "good" in abstract terms and more about deciding whether it is wise to commit now rather than later. However, this uncertainty should be understood primarily as a transitional implementation effect rather than as a permanent condition. The interviews were conducted during a phase in which the revised EPBD had not yet been fully translated into Swedish regulatory practice, and where future requirements, possible support schemes and practical compliance expectations were still being clarified. As national rules, guidance and financial instruments become more concrete, some of the uncertainty that currently encourages delay or staged investment is likely to decrease. The strategic relevance of waiting may therefore be strongest during the implementation phase, while clearer regulatory conditions may later shift firms from cautious monitoring toward more concrete investment decisions. That is very close to the mechanism described by Kumbaroğlu and Madlener (2012), who show that once uncertainty and irreversibility are taken seriously, the threshold for immediate action rises above what a simple net present value calculation would suggest. In other words, a measure can look acceptable on paper and still be postponed because the value of waiting has become significant.

The interviews also make it clear that waiting does not necessarily mean passivity. A more accurate reading is that organisations sort measures by how much flexibility they preserve. Smaller or more reversible actions are easier to justify under uncertainty, while heavier and more path-dependent interventions are treated more cautiously. This is where the empirical material becomes particularly interesting. The pattern was not one of companies standing still, but of companies moving selectively. Operational optimisation, staged packages, and narrower measures could still go ahead, while larger commitments were more often held back. That corresponds closely to the theoretical point that sunk costs increase the attractiveness of partial steps and reversible action (Ástmarsson et al., 2013). Once a building owner has committed to a major facade intervention, extensive system replacement, or a deeper renovation pathway, there is little room to undo that decision. The stronger the irreversibility, the more valuable it becomes to wait until uncertainty has been reduced.

This also helps explain why the behavioural effect of uncertainty appears strongest in the weakest-performing buildings. These are often the buildings where compliance is hardest, where measures are most intrusive, and where mistakes would be costly. Under those conditions, delay is not simply a sign of weak ambition. It can instead be understood as a strategic effort to avoid regrettable expenditures. That interpretation also gives a more precise meaning to the threshold logic seen in the results. The stopping point is not only financial or technical; it is also reached when the loss of flexibility begins to outweigh the value of acting immediately. Lundmark (2024) is useful here, since the study highlights how uncertainty can lead firms to add risk premiums or raise effective investment thresholds. That same logic was visible in the interviews, where respondents repeatedly described a need for clearer direction before taking larger steps.

One particularly important part of the material concerns the uncertainty surrounding what future compliance may mean for existing buildings. Respondents did not only lack certainty about the timing of implementation; they also lacked certainty about what the practical endpoint is supposed to be. That matters a great deal from a real-options perspective. If organisations do not know what level of intervention will ultimately count as sufficient, then overcommitting becomes a real risk. In the study, this was especially clear in relation to the interpretation that existing buildings may only be expected to do what is practically feasible. On one hand, that could be read as a source of flexibility. On the other hand, it also leaves open where the real boundary lies. Under that kind of uncertainty, it becomes rational to preserve room for adjustment rather than investing as if the endpoint were already fixed.

There is also a wider policy implication in this. A regulatory framework can be strong in direction but still weak in behavioural effect if the actors facing it do not yet know how to translate that direction

into concrete timing decisions. The results suggest that this is part of what is happening here. The EPBD clearly increases strategic attention to low-performing buildings, but uncertainty slows the conversion of that attention into immediate, large-scale action. Seen through the real-options lens, this is not surprising. Stronger signals do not automatically trigger faster investment when companies are dealing with sunk costs, uncertain rules, and the possibility that today's "rational" decision may look premature tomorrow. That is probably one of the clearest reasons why the companies in the study often described staged action, delay, or selective optimisation as wise rather than passive.

6.5 Institutional pressures and strategic responses [D]

What the institutional perspective adds most clearly in this study is not the claim that firms simply respond to regulation, but that they respond to a changing field. The revised EPBD enters an environment where real estate companies are already being evaluated through several overlapping lenses: legal compliance, sustainability expectations, capital market signals, and sector-wide ideas about what responsible asset management should look like. In that way, the directive is not only a future rulebook. It is also part of a broader shift in what counts as acceptable, credible, and strategically sound behaviour in the Swedish property sector. That is very much in line with DiMaggio and Powell (1983) and Scott (2013), who treat organisations as embedded in systems of rules, norms, and taken-for-granted expectations rather than as actors guided by efficiency alone.

The interviews fit this picture rather well, but not in a simplistic way. The companies did not speak as if EPBD had already triggered a full strategic reset. What came through was a more gradual adjustment in attention. Low-performing buildings had become harder to ignore. Energy classification had started to matter more in portfolio discussions. Some firms had begun to integrate EPBD-related concerns into business plans or internal prioritisation. Yet most respondents still stopped short of describing a fully settled EPBD strategy. That tension is interesting. It suggests that institutional pressure is already strong enough to shape strategic awareness, but not yet strong enough to produce uniform organisational change. Scott's (2013) distinction between formal rules and broader institutional expectations is useful here, because the interviews point precisely to that intermediate state: the direction of the field is visible before its practical consequences are fully fixed.

On the other side, several respondents clearly treated regulation as something that ultimately must be followed once requirements become concrete, which fits both institutional theory and May's (2004) argument that clear and enforceable standards tend to produce predictable compliance behaviour. Still, the interviews did not point to a sector that is moving simply because the law says so. What seemed to matter more was when regulatory pressure merged with something else; financing conditions, reputational signalling, benchmark values, or the risk of being left with assets that begin to look structurally weak. In those situations, the pressure became more immediate. The result is a more layered picture than a pure compliance story. Companies are not only preparing to satisfy future rules; they are also preparing to remain legitimate in a market where energy performance is becoming harder to separate from financial credibility.

That is where standardize pressure becomes especially visible. The theoretical framework describes how shared standards, certifications, investor expectations, and professional norms can slowly redefine what is seen as standard practice (Geels, 2011; Scott, 2013). The empirical material strongly supports that view. In the interviews, energy performance was not discussed only as a technical or regulatory issue, but increasingly as part of broader strategic positioning. Some firms seemed to read the direction of travel through a legitimacy lens: if regulation, investors, and the sector as a whole are moving toward stronger scrutiny of low-performing buildings, then waiting too long may become a reputational as well as an operational problem. That is a different kind of pressure from a direct legal obligation. It works less through sanctions and more through the risk of falling out of step with what the field is beginning to define as responsible conduct.

The differences in how companies responded can also be understood by looking at how companies orient themselves to other actors in the sector. Lieberman and Asaba (2006) argue that imitation can be a rational response when the costs of independent experimentation are high or when the right course of action is not yet obvious. Something close to that appears in this study. The interviews did not show a uniform imitation of specific competitors, but they did suggest a field in which companies are attentive to benchmarks, visible frontrunners, and recognised categories of acceptable action. This matters because imitation does not require blind copying to be influential. It can work through softer mechanisms: following recognised portfolio metrics, adopting familiar decision templates, or treating certain forms of energy improvement as strategically safer because they are already validated by others in the sector.

At the same time, one of the more important findings in the study is that formal adaptation and essential transformation do not necessarily move at the same pace. Bromley and Powell (2012) are particularly relevant here. Their work on decoupling helps explain why organisations may align their language, plans, and signalling with new institutional expectations before fully changing underlying practice. That dynamic is visible in the interviews. Real estate companies had clearly begun to talk differently about weak-performing buildings, regulatory exposure, and future renovation needs. But that did not always translate into immediate large-scale implementation. In several cases, strategic positioning moved ahead of deeper operational change. That does not mean the response is dishonest. It means that institutional change may first show up in categorisation, planning, and signalling before it fully reshapes investment behaviour on the ground.

The role of finance makes this even more interesting. Flammer (2021) shows that environmental performance can affect access to capital and financial conditions, and that fits the logic seen in the interviews very well. Once energy performance starts to matter for financing, legitimacy and economic incentive become intertwined. At that point, institutional pressure is no longer external to the business case. It becomes part of it. That helps explain why some respondents seemed more responsive to established market-linked frameworks than to the still-evolving EPBD itself. Pressure becomes strongest when it is not just legally foreseeable, but already legible in the terms by which companies are judged by lenders, investors, and the wider market.

What emerges is not a sector that is being pushed forward by one type of institutional force, but one that is being gradually repositioned by several at once. The revised EPBD matters because it sharpens forced expectations, but its real strategic force seems to come from how those expectations interact with legitimacy, sectoral norms, and financial signalling. That is why the responses in the material range from cautious monitoring to early repositioning rather than from simple compliance to non-compliance. The directive is beginning to reshape the field, and the real estate companies in it are adjusting not only to future rules, but to a changing sense of what kind of portfolio is defensible, credible, and competitive.

A related issue is whether changes in the energy classification system may affect not only the buildings that are already in classes F and G, but also assets currently placed in higher classes. If the classification thresholds are recalibrated over time, or if market actors begin to interpret lower energy classes more strictly, a building's strategic position may weaken even without any physical deterioration. This creates a potential reclassification risk at the portfolio level. Under such conditions, energy efficiency improvements in buildings with higher current classifications may become relevant as a defensive strategy to prevent future exposure, protect asset value and avoid a situation where a larger share of the portfolio becomes associated with low performance. This does not change the study's focus on F and G buildings, but it shows that EPBD-related strategic responses may extend beyond the current lowest-performing segment.

6.6 Implications for renovation strategies under EPBD

Taken together, the study suggests that the revised EPBD is unlikely to lead to deep renovation across all low-performing residential buildings in Sweden. A more likely outcome is a selective process, in which weaker assets receive greater strategic attention but are handled differently depending on their technical condition, financial viability, and role within the portfolio. Some buildings are likely to be upgraded more directly, others improved gradually through staged measures, and some left at a lower performance level for longer.

This selectivity may also include preventive action in buildings that are not currently among the weakest performers. If future classification rules, financing conditions or market expectations make energy performance more important for portfolio valuation, companies may have incentives to improve buildings before they fall into a strategically exposed category. Renovation strategy under the EPBD may therefore involve both reactive measures in clearly low-performing buildings and preventive measures in buildings that are closer to future classification or financing thresholds.

This reflects a basic mismatch between the way the EPBD is designed and the way renovation decisions are made in practice. The directive addresses the residential stock at an aggregated level, while firms still make decisions building by building and often in relation to maintenance cycles, local market conditions, and asset-specific constraints. In the Swedish context, this makes uneven implementation more likely than uniform compliance at building level, especially since the residential part of the recast EPBD is framed through national stock-level trajectories rather than equally binding requirements for every individual building (Boverket, 2025a; European Comission, 2024b). What the results point to, is a more filtered transition: low-performing buildings become harder to ignore, but the depth and timing of renovation still depend on how regulatory expectations interact with economic limits, technical constraints, and the practical realities of implementation.

7 Conclusions

This chapter presents the main conclusions of the study by answering the three research questions. The conclusions are drawn from the combined findings of the results and discussion chapters.

7.1 RQ1

How does the EPBD influence Swedish real estate companies' investment decisions in energy efficiency measures when renovating residential buildings in energy classes F and G?

The findings show that the revised EPBD influences investment decisions primarily by increasing the strategic visibility and long-term relevance of low-performing residential buildings rather than by fundamentally changing existing financial decision rules. Real estate companies continue to rely on established investment criteria such as return requirements, payback periods and capital allocation frameworks when evaluating renovation measures. In this sense, the directive does not replace prevailing economic logics but operates within them, shaping how investment priorities are assessed and sequenced over time.

At the current stage of implementation, the EPBD is generally interpreted as an emerging regulatory condition that requires monitoring and gradual integration into portfolio-level planning. Its practical significance is therefore more incremental than transformative. The directive contributes to a growing need to identify and systematically track buildings with weaker energy performance, but investment decisions remain strongly influenced by building-specific conditions, maintenance cycles, financing constraints and organisational capacity. Low-performing buildings are not automatically prioritised; rather, they are addressed when renovation becomes technically necessary and financially justifiable within existing planning frameworks.

A central mechanism through which the EPBD affects decision-making is its interaction with regulatory uncertainty. Uncertainty regarding the timing, scope and practical interpretation of future national requirements encourages cautious investment behaviour, including phased planning and delayed commitments to large, irreversible renovation measures. This pattern reflects a rational response to uncertain policy conditions, where firms seek to preserve flexibility while maintaining compliance readiness.

The results thus indicate that the revised EPBD currently functions less as a direct driver of immediate renovation activity and more as a coordinating signal that gradually reshapes portfolio-level planning and risk management. Its influence is therefore best understood as reinforcing existing investment structures while increasing the strategic importance of energy performance within long-term asset management.

This effect should be understood in relation to the current implementation phase. Some of the uncertainty that currently delays larger investment commitments is likely to decrease as Swedish rules, classification thresholds, support mechanisms and compliance expectations become clearer. The EPBD's influence may therefore become more direct over time, even if its current effect is mainly to increase strategic attention and preparedness.

7.2 RQ2

Which energy efficiency measures or packages of measures are perceived as most relevant for achieving future EPBD-related requirements in Swedish residential buildings?

The interviews indicate that the relevance of specific energy efficiency measures is primarily determined by practical feasibility and timing rather than by theoretical energy-saving potential alone. In the Swedish residential context, measures are rarely selected in isolation. Instead, they are typically implemented when they can be integrated into planned renovation or maintenance activities, where the additional cost of improving energy performance is more manageable.

Operational and system-related improvements were frequently described as realistic starting points. Measures such as heating system adjustments, improved control and monitoring, ventilation upgrades and heat recovery systems were commonly prioritised because they involve relatively limited risk, shorter implementation times and less disruption to tenants. These characteristics make them suitable early actions when addressing buildings with weaker energy performance.

More extensive building envelope measures, such as facade or roof improvements, were recognised as necessary for achieving deeper reductions in energy use. However, their implementation was strongly linked to the building's technical lifecycle. Respondents consistently described such measures as becoming relevant when structural renovation is already required, rather than as stand-alone energy investments.

Another recurring theme concerns the importance of combining measures into coordinated renovation packages. Companies rarely evaluate individual actions separately; instead, they balance more and less profitable measures within a single project to achieve an acceptable overall return. This approach reflects the reality that energy efficiency investments must compete with other capital needs within long-term asset management.

Taken together, the measures perceived as most relevant under the EPBD are those that align with existing renovation cycles and organisational planning routines. Compliance is therefore expected to emerge gradually through staged renovation processes rather than through isolated, one-time interventions.

7.3 RQ3

How do different thresholds shape Swedish real estate companies' perceptions of when additional energy efficiency measures become less feasible or cost-effective under the requirements of the EPBD?

The results indicate that limits to further energy efficiency investment are not defined by a single economic breakpoint, but by the interaction of economic, technical and strategic considerations. Rather than identifying a precise numerical threshold, respondents described a set of practical boundaries beyond which additional measures become increasingly difficult to justify within existing investment frameworks.

Economic thresholds were consistently described as the most immediate constraint. Investments in energy efficiency are typically pursued up to the point where expected returns fall below internal requirements or where financing becomes uncertain. In practice, this means that measures with longer payback periods or higher perceived risk are often postponed or excluded, even when they offer substantial energy savings. Access to capital and regional property values were also highlighted as important factors shaping these limits, particularly in weaker housing markets where borrowing capacity may restrict otherwise reasonable investments.

Technical thresholds were closely linked to building-specific conditions and physical feasibility. Respondents emphasised that some buildings, especially older properties with structural limitations, require disproportionately large investments to achieve further performance improvements. In such cases, the cost and complexity of additional measures increase rapidly once the most accessible improvements have already been implemented. This creates a practical boundary where deeper renovation becomes technically possible but economically and operationally difficult to justify.

Strategic thresholds were primarily associated with uncertainty and long-term planning considerations. Unclear regulatory timelines, evolving policy requirements and competing investment priorities encourage a cautious approach to major renovation decisions. Organisations therefore tend to phase investments over time, maintaining flexibility until future regulatory conditions become clearer. This staged planning logic reflects a risk management strategy in which firms seek to avoid irreversible commitments under uncertain conditions.

These findings suggest that limits to further energy efficiency improvement emerge gradually rather than at a single decision point. Investment decisions are shaped by the cumulative effect of financial constraints, technical feasibility and strategic uncertainty, all of which interact within the broader context of portfolio management. In this sense, thresholds should be understood as dynamic boundaries that shift over time as market conditions, building characteristics and regulatory expectations evolve.

7.4 Overall conclusions

This study shows that the revised EPBD influences renovation decisions primarily by increasing the strategic importance of energy performance rather than by fundamentally changing existing investment logics in the residential sector. Energy efficiency measures are implemented when they align with building conditions, financial feasibility and long-term planning cycles, and limits to further renovation emerge from the interaction of economic, technical and strategic constraints rather than from a single decision threshold.

The findings also suggest that EPBD-related portfolio strategies may extend beyond the buildings currently in lower energy classification. If future classification thresholds or market expectations change, buildings with higher current energy classes may also become relevant for preventive energy efficiency measures. This means that companies may not only respond to the weakest-performing buildings but also seek to reduce future exposure across the wider portfolio.

In this sense, the directive functions less as a direct driver of immediate renovation and more as a gradual steering mechanism that integrates energy performance into routine asset management. The findings highlight that regulatory effectiveness depends not only on formal requirements, but also on how these requirements interact with financing conditions, building lifecycles and organisational decision-making structures.

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9 Appendix

9.1 Interview guide for Swedish property companies

Inledande och avslutande frågor

S1. Kan du kort beskriva din roll och vilka ansvarsområden du har? Hur är er organisation strukturerad när det gäller byggnadsförvaltning och energifrågor?

S2. Hur länge har du arbetat med fastighetsförvaltning eller energi-/hållbarhetsfrågor? Har du varit med om tidigare regeländringar eller strategiska satsningar?

S3. Vilka övergripande mål har er organisation för energieffektivisering och klimat? Och hur ser dessa ut i relation till äldre bostadsbyggnader i ert bestånd?

- Är målen påverkade av lagstiftning (till exempel EPBD) eller interna klimatstrategier?

S4. Vad motiverar er organisation att genomföra energieffektiviseringsåtgärder?

- Rör det sig om kostnadsbesparingar, miljömål, image, lagkrav, eller annat?"

S5. Är det något vi inte har tagit upp som du tycker är viktigt för energieffektivisering och investeringar?

Kategori A: Energieffektiviseringsgap och investeringshinder:

A1. Hur upplever du gapet mellan teknisk potential för energieffektivisering och de faktiska investeringarna ni gör, särskilt i äldre bostadsbyggnader med låg energiprestanda?

- Finns det outnyttjade möjligheter i sådana byggnader? Vad påverkar i så fall om de genomförs eller inte?

A2. Finns det interna organisatoriska hinder påverkar beslut om energieffektivisering i er verksamhet?

- Använder ni korta återbetalningstider eller liknande riktlinjer?

A3. Hur bedömer ni lönsamheten i era energieffektiviseringsprojekt?

- Särskilt i äldre bostadsbyggnader med låg energiprestanda?
- Vilka kalkyler eller nyckeltal används? Påverkar det ert beslut?
- Skiljer sig bedömningen mellan byggnader med svagare energiprestanda och övriga byggnader?

A4. Upplever ni brister i information eller kunskap när ni planerar energieffektivisering?

A5. Vilken betydelse har andra faktorer (t.ex. inomhuskomfort, hyresgästkrav) i era investeringsbedömningar?

A6. Hur kategoriseras era byggnader (ålder, prestanda) vid energieffektiversings åtgärden?

- Anpassas åtgärderna efter byggnadens karakteristika?

A7. Hur stor del av ert bostadsbestånd utgörs av äldre byggnader med låg energiprestanda, till exempel i energiklass F och G?

- Vilken betydelse har det för ert arbete att EPBD i praktiken riktar särskild uppmärksamhet mot byggnader med svag energiprestanda?

Kategori B: Relationen fastighets och hyresgäster och delade incitament:

B1. Hur påverkar relationen mellan fastighetsägare och hyresgäster era investeringsbeslut?

- Betalar hyresgästerna energikostnader? Hur matchar det med ägarens nytta?

B2. Kan du ge exempel på energirenoveringar där hyresgäster och fastighetsägare haft olika incitament?

- Vem får betala, och vem drar nytta?

B3. Uppstår det ibland situationer där kostnader för energieffektivisering faller på en aktör medan nyttan hamnar hos en annan?

- Hur hanteras detta i era hyresavtal eller kontrakt?

B4. Upplever ni informationsgap mellan olika aktörer (ägare, driftspersonal, hyresgäster) som påverkar besluten?

- Svårigheter med data från drift, kommunikation med hyresgäster?

B5. Hur påverkar interna prioriteringar (till exempel avkastningskrav för byggnader) era energieffektiva investeringar?

- Har ni intern tävling mellan olika projekt och fastigheter?

Kategori C: Regulatorisk osäkerhet:

C1. Påverkar osäkerhet om framtida regeländringar, eller om hur EPBD kommer att tillämpas i Sverige, tidpunkten för era investeringar?

- Blir detta särskilt tydligt i äldre bostadsbyggnader med låg energiprestanda?

- Väntar ni på klara signaler innan ni genomför åtgärder?

C2. Har ni exempel på investeringar som ni sköt upp i väntan på tydligare besked (till exempel om kommande stödsystem eller krav)?

- Fas indelar ni projekt för att minska osäkerhet?

C3. Hur hanterar ni risken att tekniska lösningar snabbt kan bli föråldrade?

- till exempel om solpaneler/fjärrvärme förändras – planerar ni för uppgradering?

C4. I vilken mån påverkar energiprisernas volatilitet era kalkyler?

- Antar ni stabila eller volatila energipriser vid kalkylering?

C5. Hur hanterar ni osäkerhet kring framtida styrmedel (subventioner) eller stöd i era investeringsbeslut?

- Följer ni aktivt information om möjliga kommande stödprogram?

- Letar ni aktivt info om kommande stödprogram?

C6. Finns strategier för att minimera osäkerhet, till exempel successiv renovering snarare än helrenovering?

- Börjar ni med mindre åtgärder för att utvärdera effekter?

Kategori D: Institutionella normer och strategiska svar:

D1. Vilken betydelse har lag- och regelkrav, till exempel EPBD och andra relevanta svenska regler, för era beslut om renoveringar i äldre bostadsbyggnader?

- Har nya krav lett till planerade åtgärder eller investeringsbehov?

D2. Hur påverkas ni av branschstandarder eller certifieringar (till exempel Miljöbyggnad, LEED) i energieffektiviseringsprojekt?

- Följer ni några frivilliga eller obligatoriska certifieringar?

D3. Möter ni förväntningar från ägare, styrelse eller bolagsledning att satsa på energieffektivisering?

- Finns långsiktiga hållbarhetsplaner eller mål som ni ska uppfylla?

- Vad har ni för tankar kring 2050 målen i EPBD.

D4. På vilket sätt samarbetar ni eller kommunicerar med myndigheter och branschorganisationer kring energikrav?

- Deltar ni i remissvar, arbetsgrupper eller får vägledning?

D5. Har förändrade kund- eller hyresgästkrav (till exempel efterfrågan på gröna byggnader) påverkat era energieffektiviseringsbeslut?

- Har kunder ställt högre energikrav vid upphandlingar?

D6. Hur planerar ni för att hantera EPBD-kraven när de träder i kraft, särskilt i relation till äldre bostadsbyggnader med låg energiprestanda?

- Hur resonerar ni kring prioritering mellan olika byggnader och delar av beståndet?

- Vet ni tidsplanen för implementeringen i Sverige?

- Kommunikation med EPBD?

- Tankar kring böter angående "dåliga" bostäder

D7. Finns det energieffektiviseringsåtgärder, eller kombinationer av åtgärder, som ni idag ser som särskilt relevanta att överväga i äldre bostadsbyggnader med låg energiprestanda?

- Vilka typer av åtgärder handlar det om?

- Hur resonerar ni mellan enskilda åtgärder och större åtgärdspaket?

- Finns det situationer där ytterligare åtgärder bedöms ge för låg nytta i relation till kostnaden?

D8. Hur hade du ändrat och implementerad på EPBD?

9.2 Interview guide for representatives from Boverket

Inledande och avslutande frågor

1. Kan du beskriva din roll på Boverkets och i vilken utsträckning är du involverad i implementeringen av EPBD?

2. Hur länge har du arbetat med din nuvarande roll? Har du tidigare erfarenheter av EU-direktiv eller byggnormer relaterade till energi?"

3. Vilka övergripande mål och prioriteringar har Boverket när det gäller energieffektivisering i byggnader? Är målen kopplade till nationella klimatmål, BBR, EPBD?"

4. Hur ser ansvars- och beslutsprocesserna ut internt när det gäller att översätta EU-reglering till den svenska lagstiftningen? Finns särskilda arbetsgrupper eller samverkansprojekt för EPBD-implementering?"

5. Avslutningsfråga: Är det något mer du vill tillägga om Boverkets arbete med EPBD?

Kategori A: Energieffektiviseringsgap och investeringsbarriärer

A1. Vad är de största utmaningarna som Boverket ser med att få fastighetssektorn att investera i energieffektivisering? Hur får ni fastighetsbolag att faktiskt genomföra investeringar, styrmedel, vite?

A2. Hur arbetar Boverket för att förbättra kunskapen om energieffektivisering?

A3. Ser du skillnader i potentiell energieffektivisering mellan olika byggnadssektorer- t.ex. Bostäder, kontor, industri?

A4. Hur stor roll spelar energipolitiska mål till exempel EU-mål – i Boverkets generella arbete med energieffektivisering?

A5. Vilka aktörer anser du vara mest centrala för att minska energieffektiviseringsgapet? Är det fastighetsägare, kommuner, staten?

Kategori B: Delade incitament

B1. Hur arbetar Boverket med att ta hänsyn till både fastighetsägaren och hyresgästen i era rekommendationer eller regler?

B2. Har ni identifierat situationer där olika statliga myndigheter har motstridiga incitament, till exempel överlapp i regler mellan Boverket och Energimyndigheten?

B3. Finns exempel på pilotprojekt eller program där Boverket har testat nya riktlinjer och regler och sedan tagit in respons och förändrat direktivet?

B4. Hur tar ni hänsyn till olika intressenters behov i er regelutveckling, till exempel olika typer av fastigheter? Engageras fastighetsägarna vid remisshanteringen?

B5. Upplever du att det finns brister i informationsflödet mellan aktörer (till exempel fastighetsägare, myndigheter och konsulter) kring krav, data eller tolkning av EPBD?

B6. Vad tror du är fastighetsföretagens största utmaning med att anpassa sig efter EPBD?

Kategori C: Reala optioner och regulatorisk osäkerhet

C1. Hur hanterar Boverket osäkerheten kring tidpunkten för framtida skärpta energikrav (EPBD-krav)? Uppmuntrar ni till småskalig successiv renovering eller att de ska vänta på tydligare besked?

C2. Har du sett exempel på att aktörer avvaktar investeringar i sina fastigheter i väntan på ny lagstiftning eller stöd?

C3. Hur beaktar ni pris- och teknikosäkerhet (till exempel energipriser, teknikpriser) vid råd om energieffektiviseringsinvesteringar?

C4. Vilka insatser gör Boverket för att minska fastighetsägares oro för att göra felinvesteringar i energieffektiviseringsåtgärder?

C5. Följer Boverket upp effekten av tidigare regeländringar. till exempel Tidigare versioner av EPBD för att lära inför framtiden? Och isåfall hur?

Kategori D: Institutionella påtryckningar och strategiska ageranden

D1. Vilka formella krav och mål är mest styrande från EU och hur förmedlar Boverket detta i EPBD?

D2. Uppmuntrar ni till certifieringar och miljöstandarder som till exempel LEED eller BREEAM eller några ISO-standarder genom EPBD?

D3. Hur arbetar Boverket strategiskt för att implementera EPBD trots eventuella motstridiga politiska intressen?

D4. Hur samarbetar Boverket med andra aktörer (myndigheter, kommuner, näringsliv) för att uppfylla EU-kraven?

D5. Hur förväntar du att Boverkets insatser för energieffektivisering utvärderas och följas upp?

D6. Hur kommunicerar Boverket sina initiativ och krav till allmänhet, media och näringsliv? Hur fungerar dialogen utåt?

D7. Tror du att EPBD kommer ge utdelning och i så fall var tror du det blir mest synligt om kanske 10 år?