

Thesis for the degree of Doctor of Philosophy

Experimenting for Sustainability

Institutional Capacity Building in
Swedish Sustainable Urban Development Projects

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Institutional Capacity Building in Swedish Sustainable Urban Development Projects
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Abstract

Sustainable urban development projects play an important role in translating broad sustainability ambitions into context-specific actions through planning practices. However, many projects face an implementation gap between initial goals and realised outcomes. Explanations often highlight fragmented governance, regulatory constraints, shifting responsibilities, and weak continuity across planning phases. Experimentation – through pilot projects, demonstration projects, and living labs – has emerged as a strategy to address these challenges by developing and improving planning instruments, governance arrangements, and sustainability outcomes.

This thesis examines how energy policies are implemented over time in sustainable urban development projects, focusing on how local governments and developers build institutional capacity. Using Healey's framework of institutional capacity building, it investigates how actors mobilise knowledge, foster relationships, and implement collective action and examines how these dynamics shape the implementation of sustainable urban development projects.

The thesis draws on four papers examining three Swedish cases: the urban development projects of Kvillebäcken (Gothenburg), Vallastaden (Linköping), and Brunnshög (Lund). Sweden provides a relevant context due to its long history of experimenting for sustainability in the built environment, its decentralised planning system, and its advanced implementation of energy policies, while also facing new governance challenges resulting from recent legal reforms that limit local authority. The four papers use a semi-systematic literature review, semi-structured interviews with local government representatives and developers, planning document analysis, and energy data, offering longitudinal insights into how energy policies are translated into practice.

Findings indicate that fragmented responsibilities, weak accountability, and limited enforcement undermine implementation capacity, causing ambitions to weaken over time. Governance arrangements such as project-specific sustainability visions and land allocation processes provide opportunities for experimentation and initially support energy policy implementation, but their effectiveness often diminishes without follow-up. Embedding experimentation within formal governance structures, clarifying responsibilities, strengthening regulatory frameworks, and maintaining continuous monitoring are crucial for closing the gap between ambition and outcome in sustainable urban development projects.

Sammanfattning

Hållbara stadsutvecklingsprojekt spelar en central roll för att konkretisera breda hållbarhetsambitioner till kontextspecifika åtgärder i planeringen. Trots höga ambitioner uppstår ofta ett implementeringsgap mellan initiala mål och uppnådda resultat. De förklaringar som ges handlar om fragmenterad styrning, regelmässiga begränsningar, förändrade ansvarsområden och bristande kontinuitet mellan olika planeringsfaser. Experimenterande – genom pilotprojekt, demonstrationsprojekt och living labs – har uppstått som en strategi för att möta dessa utmaningar, inom vilka planeringsinstrument, styrningsarrangemang och hållbarhetsresultat utvecklas och förbättras.

Föreliggande avhandling undersöker hur energipolitik implementeras över tid i hållbara stadsutvecklingsprojekt, med fokus på hur kommuner och byggherrar bygger institutionell kapacitet. Med utgångspunkt i Healeys ramverk för institutionell kapacitetsuppbyggnad undersöks hur aktörer mobiliserar kunskap, främjar relationer och genomför kollektiva handlingar, samt hur dessa dynamiker påverkar genomförandet av hållbara stadsutvecklingsprojekt.

Avhandlingen bygger på fyra artiklar där tre svenska fall analyseras: stadsutvecklingsprojekten Kvillebäcken (Göteborg), Vallastaden (Linköping) och Brunnshög (Lund). Sverige utgör ett relevant sammanhang tack vare sin långa tradition av *experimenterande för hållbarhet* i den byggda miljön, sitt decentraliserade planeringssystem och genom en långtgående implementering av energipolitik. Detta samtidigt som landet står inför nya utmaningar för styrning till följd av de senaste lagreformerna som begränsar kommunernas handlingsutrymme. De fyra artiklarna kombinerar en semi-systematisk litteraturöversikt, semistrukturerade intervjuer med kommunrepresentanter och byggherrar, analyser av planeringsdokument samt energidata, och erbjuder longitudinella insikter i hur energipolitik omsätts i praktiken.

Resultaten visar att fragmenterade ansvarsområden, svag ansvarsskyldighet och begränsad tillsyn underminerar implementeringskapaciteten och gör att ambitionerna urholkas över tid. Styrningsarrangemang i form av projektspecifika hållbarhetsvisioner och markanvisningsprocesser erbjuder utrymme för experimenterande och stödjer initialt implementeringen av energipolitiken, men deras effekt minskar ofta över tid och lämnas utan uppföljning. Avgörande förbättringspotential för att överbrygga gapet mellan ambition och resultat i hållbara stadsutvecklingsprojekt ligger i att skapa formella styrningsstrukturer runt experimenterandet, klargöra ansvar, stärka regelverken och upprätthålla kontinuerlig uppföljning.

List of papers

Paper 1

van der Leer, J., Calvén, A., Glad, W., Femenias, P., & Sernhed, K. (2023). Energy systems in sustainability-profiled districts in Sweden: A literature review and a socio-technical ecology approach for future research. *Energy Research & Social Science*, 101, 103118.

Paper 2

van der Leer, J., Femenias, P. & Granath, K. (2026). Implementing minimum energy performance requirements 'from the middle': shifting levels of agency and capacity of housing developers in Sweden. *Energy Policy*, 208, 114901.

Paper 3

Healey Trulsrud, T., & **van der Leer, J.** (2024). Towards a positive energy balance: A comparative analysis of the planning and design of four positive energy districts and neighbourhoods in Norway and Sweden. *Energy and Buildings*, 318, 114429.

Paper 4

van der Leer, J. (under review after first revision). Building institutional capacity through experimentation in sustainable urban development projects in Sweden.

Author's contributions to papers

Paper 1

I co-authored Paper 1 as part of an interdisciplinary research project on urban development and sustainable energy systems in Sweden. Together with Alexandra Calvén, I conceptualised the literature review, analysed the material, and wrote the first draft. In collaboration with Wiktorina Glad, I developed the theoretical framework and wrote the discussion and conclusions. I was responsible for revising the paper. The co-authors provided feedback throughout the analysis, writing, and revision stages.

Paper 2

I am the first author of Paper 2 and played a leading role in developing its main arguments and structure. The study was conceptualised and planned jointly with Paula Femenias and Kaj Granath. I conducted the empirical analysis and was responsible for the writing. The co-authors contributed to data collection and provided feedback throughout the analysis, writing, and revision stages.

Paper 3

Paper 3 was co-authored with Tonje Trulsrud Healey-Brudal, and we contributed equally to the work. I collected and analysed the data for the Swedish case studies.

Paper 4

I am the sole author of Paper 4.

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Abbreviations

BBR	Swedish building regulations (<i>Boverkets byggregler</i>)
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
EPC	Energy performance certificate
EU	European Union
LEC	Local energy community
MEPR	Minimum energy performance requirement
NGO	Non-governmental organisation
NZEB	Nearly zero energy building
PBL	Planning and Building Act (<i>plan- och bygglagen</i>)
PED	Positive energy district
PV	Photovoltaics
UN	United Nations

CHAPTER 1

Introduction

Since the Brundtland Report introduced the concept of sustainable development in 1987, urban planning has increasingly been recognised as a key field for achieving sustainability ambitions (Hamdan, Andersen, et al., 2021; Persson, 2013; Tanguy et al., 2020). Even before sustainability became an explicit policy objective, urban planners already aimed to create more livable neighbourhoods (Sharifi, 2016; Tanguy et al., 2020) with Howard's Garden Cities (1898) providing an early example. Today, sustainability has been identified as a central objective in urban planning at global, regional, national, and local levels (Rapoport, 2018; Rydin, 2010). International frameworks like the New Urban Agenda and the United Nations' (UN) Sustainable Development Goal 11 (Sustainable Cities and Communities) emphasise inclusive, resilient, and sustainable cities. European Union (EU) initiatives such as the European Urban Initiative and the New European Bauhaus promote integrated approaches to urban development, aiming for sustainability, inclusivity, and aesthetics. Many countries and cities have also developed local policies focusing on renewable energy, low emission mobility, waste reduction, and green spaces. Taken together, these initiatives demonstrate a multi-level commitment to advancing sustainable urban development at global, regional, national, and local scales (Albrechts, 2010).

Local planning practices play an important role in translating the broad sustainability ambitions into context-specific actions (Högström et al., 2021). Planning at the neighbourhood or district scale has increasingly become a common entry point for addressing sustainability in the urban context (Fitzgerald & Lenhart, 2016; Sharifi, 2016), often described using terms such as eco-districts, sustainable neighbourhoods, or zero-emission neighbourhoods. These projects aim to develop new urban areas or redevelop existing ones, translating broad sustainability goals into place-based actions

(Rapoport, 2018), with a focus on balancing environmental protection, sustained economic activity, and social well-being (Rydin, 2010). Well-known European examples include BedZED in London (UK), the GWL-terrein in Amsterdam (the Netherlands), Hammarby Sjöstad in Stockholm (Sweden), and Vauban in Freiburg (Germany) (Femenias, 2004; Hajer et al., 2020; Williams, 2016).

In this thesis, I use the term *sustainable urban development project*¹ to describe geographically bounded projects that are explicitly framed by actors as contributing to sustainability. Such projects are best understood as distributed, long-term urban planning processes involving multiple actors, whose actions and influence unfold over time and are tied to the specific location (Karrbom Gustavsson et al., 2023). Sustainable urban development is often presented as a clear goal; however, it remains a contested and evolving concept in practice. What is considered *sustainable* differs not only between countries but also within cities, across departments, and among actors (Metzger & Lindblad, 2020). Hallin et al. (2021) note that sustainability is always local, temporal, and political – shaped by shifting interests, ideologies, and practical constraints. It should therefore be seen as plural and dynamic, formed through competing interests and evolving visions over time (Hallin et al., 2021; Metzger & Lindblad, 2020). Both Hallin et al. (2021) and Metzger & Lindblad (2020) emphasise the importance of focusing on sustainability as it is practised: examining what is actually done in sustainable urban development projects and unpacking the practical, political, and institutional complexities that are often oversimplified or overlooked in research.

The implementation of urban development projects is shaped by different governance arrangements, consisting of the formal and informal institutional structures, decision-making processes, and actor relationships that determine how planning instruments are applied (Devecchi, 2013; Hodson et al., 2017; Oldbury & Isaksson, 2021; Oliveira & Hersperger, 2018; Peacock &

1 Some Swedish scholars use the term sustainability-profiled urban district or neighbourhood to avoid normative assumptions and to discuss how sustainability is presented and branded (Candel & Törnå, 2021; Eidenskog & Glad, 2023; Smedby, 2016b). This thesis adopts the term sustainable urban development project to emphasise the empirical character of the cases: geographically bounded interventions explicitly framed by actors as contributing to sustainability, involving long-term, multi-actor governance processes in a project setting (Karrbom Gustavsson et al., 2023). Following this understanding, the use of the adjective sustainable does not imply a normative evaluation of whether the projects are actually sustainable; rather, it reflects how such projects are positioned, justified, and interpreted by the actors involved.

Allmendinger, 2021). Governance arrangements are dynamic, relational, and continually reconfigured (Parks, 2019). They differ across contexts, involving different constellations of actors – such as (local) governments, developers, utility companies, NGOs, and citizens – and a range of planning instruments, including regulations, incentives, and knowledge-sharing mechanisms. Governance arrangements often combine elements of hierarchical planning with more collaborative approaches, driven by political goals and the need to engage actors in shaping and delivering policies (Mäntysalo & Bäcklund, 2017; Puustinen et al., 2025; van Bueren & ten Heuvelhof, 2005).

Despite extensive policy commitments, an *implementation gap*² remains between sustainability ambitions and realised outcomes (Brokking et al., 2020; Hamdan, de Boer, et al., 2021; Hedborg & Rosander, 2023; Hodson et al., 2018; Holmstedt et al., 2017; Krueger, 2023; Pandis Iverot & Brandt, 2011). Explanations include regulatory limitations, weak or evolving governance arrangements, lack of coordination and accountability, and inconsistent integration across different planning phases (Brokking et al., 2020; Hedborg & Rosander, 2023; Hodson et al., 2018; Pandis Iverot & Brandt, 2011). As projects move from planning to implementation, responsibilities shift, actor constellations change, and original visions often fragment into isolated tasks reflecting individual priorities (Holmstedt et al., 2017; Karrbom Gustavsson et al., 2023; Nielsen et al., 2019). The long timeframes typical of urban development further increase the risk that shifting responsibilities across actors and departments weaken the implementation of initial sustainability ambitions (Holmstedt et al., 2017). To address these challenges, experimentation has emerged as a strategy for innovation and learning through pilot projects, testbeds, living labs, or demonstration projects (Torrens & von Wirth, 2021). Experimentation involves new technologies, policy goals, and relationships between actors (Parks, 2019). In urban planning, experimentation is increasingly used to develop exploratory, adaptive, and learning-based approaches (Scholl & De Kraker, 2021; Sharp & Raven, 2021), aiming to innovate and improve planning instruments, governance arrangements, and sustainability outcomes (Karvonen, 2018; Scholl & De Kraker, 2021; Schreiber et al., 2023).

2 The term implementation gap is used in this thesis to describe the difference between planned policies or measures and their outcomes. While sometimes referred to as a performance gap (Krueger, 2023), that term is more commonly associated with energy performance. The term implementation gap is therefore used here to capture a broader mismatch between policy ambitions and outcomes.

Addressing the implementation gap requires a closer look at how planning processes unfold over time and how governance arrangements shape long-term institutional capacity and outcomes (Candel & Törnå, 2021; Högström et al., 2021; Kågström, 2020; Moore & Higgins, 2016; Smedby, 2016a). Recent studies have called for research on how sustainability goals can be integrated and sustained within decentralised governance structures (Hedborg & Rosander, 2023) and how process design can support learning and foster innovative approaches that better align sustainability goals across planning levels and processes (Högström et al., 2023).

To explore how sustainability ambitions are implemented over time, this thesis adopts institutional capacity building as its theoretical framework (De Magalhães et al., 2002; Healey, 1998). This framework provides insight into how institutional structures enable and constrain planning efforts and how actors build capacity to implement collective action and change. Institutional capacity building refers to the ability of governance systems to mobilise knowledge, foster relationships, and generate collective action. It also provides a lens for understanding how experimentation contributes to learning and institutional change over time.

This thesis uses the implementation of energy policies as its empirical lens to understand how planning processes translate sustainability ambitions into concrete outcomes. Examining how energy policies are applied in urban development projects offers insights into the challenges of implementing broader sustainability ambitions (Petersen & Heurkens, 2018). Since 2002, the main energy policy addressing the built environment in the EU has been the Energy Performance of Buildings Directive (EPBD), which sets minimum energy performance requirements (MEPRs) for new buildings and promotes the use of energy performance certificates (EPCs) (Economidou et al., 2020; Pasichnyi et al., 2019). The directive also encourages integrating energy efficiency, renewable energy, and district heating and cooling when planning and designing new urban areas. Energy-conscious urban planning has long been central to sustainable urban development (Næss, 2001) and has become even more relevant with the growing emphasis on local energy communities (LECs) and positive energy districts (PEDs) (Koutra et al., 2023).

For three reasons, Sweden provides a rich context for examining institutional capacity building, experimentation in governance arrangements, and the implementation of energy policies in sustainable urban development projects.

First, Sweden has a long tradition of *experimenting for sustainability* in the built environment, from low-energy housing in the 1970s and 1980s (Niskanen & Rohrer, 2022) and early demonstration projects in the early 2000s (Femenias et al., 2009; Femenias, 2004), to large-scale urban developments such as Hammarby Sjöstad (Stockholm) and Western Harbour (Malmö) (Fitzgerald & Lenhart, 2016; Holgersen, 2023; Hult, 2015; Mahzouni, 2015). Second, Sweden has a decentralised planning system, with local governments³ holding the authority to decide when, where, and how urban development takes place within their municipal boundaries (Brokking et al., 2020; Högström et al., 2019; Kågström, 2020; Kalbro, 2013). However, a legal reform since 2015 limits the ability of local governments to impose stricter building standards on developers, driving new forms of governance and experimentation (Parks, 2019; Smedby, 2020). This has increased the need to study interactions between local governments and developers in the context of sustainable urban development (Brokking et al., 2020; Caesar, 2016; Candel & Törnå, 2021). Third, Sweden has fully implemented the EPBD since 2014, with energy requirements in place since 2006 and EPCs primarily based on measured energy data (Karlsson Hjorth et al., 2022), enabling evaluation of policy outcomes and a deeper understanding of the multilevel governance.

1.1 Aim and research questions

The aim of this thesis is to examine how institutional capacity for sustainable urban development projects is built over time through experimentation in urban planning, with a focus on the implementation and follow-up of energy policies.

The following three research questions guide the research:

RQ1: How do the roles and responsibilities of local governments and developers influence the implementation of energy policies in Swedish sustainable urban development projects?

RQ2: How are energy policies implemented through governance arrangements in Swedish sustainable urban development projects?

³ In this thesis, the term local government refers to the public administration responsible for governing a local part of the economic territory. In the Swedish context, the term municipality is considered synonymous with local government.

RQ3: How can institutional capacity building be strengthened to improve the implementation of sustainable urban development projects?

1.2 Thesis outline

The thesis is structured in two parts: the *kappa*⁴ and the four accompanying papers. The kappa provides an integrated narrative that situates the research, presents the theoretical and methodological approaches, and synthesises the findings. Chapter 2 situates the thesis within broader discussions on urban planning, governance, and sustainable urban development. This chapter also provides the Swedish context and an overview of energy policies in the built environment. Chapter 3 presents the theoretical framework that guides the analysis throughout the thesis. Chapter 4 describes the research process and methodological approach, including the literature review and empirical studies underpinning the thesis. Chapter 5 summarises the four papers, highlighting their individual contributions. Chapter 6 integrates the findings from the papers and presents a comprehensive analysis and discussion of the results. Finally, Chapter 7 concludes the thesis, outlining its contributions to research and practice and suggesting directions for future research.

4 In Sweden, the term kappa refers to the comprehensive summary of a compilation thesis. A compilation thesis consists of several papers accompanied by this summary, which situates the papers within the broader research field, demonstrates the author's command of existing literature, and highlights the contributions made.

CHAPTER 2

Situating the research

In this chapter, I outline the contextual foundations that frame this thesis, situating the research within urban planning, sustainable urban development, and energy policies. I begin by introducing urban planning as a governance activity, establishing a general background for understanding how planning processes are organised and how they shape urban development projects. I then turn to research on sustainable urban development and experimental approaches in planning, which provide important insights into how sustainability ambitions are translated in practice. To ground the analysis in its empirical setting, I offer an overview of sustainable urban development in Sweden, before discussing the specific institutional and procedural features of the Swedish planning system. Finally, I address the multilevel policy context of energy policies in the built environment, highlighting how national and EU directives interact with local planning practices. Together, these sections provide the contextual basis for analysing how institutional capacity for sustainable urban development projects is built over time through experimentation in urban planning.

2.1 Understanding urban planning as a governance activity

For a long time, planning was performed and understood as a state-driven and technical activity focused on the design and implementation of urban development (Krueger et al., 2019). Around the 1980s, however, the concept of governance became more prominent in planning theory and practice as a framework to achieve urban development (Čolić et al., 2022; Krueger et al., 2019). This is often referred to as the shift from government to governance. Planning scholars find the concept of governance useful for explaining how traditional, state-led planning has shifted into a more complex system involving the state, market, and civil society, allowing a broader range of

actors and interests to participate (Schmitt & Danielzyk, 2018). Over the years, a wide range of governance-related terms have been used in the context of urban planning, such as urban governance, local governance, public–private governance, interactive governance, self-governance, climate governance, and territorial governance, that reflect the scale, thematic focus or mode of governance in different contexts (Nieminen et al., 2021; Schmitt & Danielzyk, 2018; Schmitt & Wiechmann, 2018).

The concept of governance in urban planning is closely linked to the rise of communicative planning approaches that emerged in the early 1990s, which emphasise dialogue, participation, and cooperation among diverse actors (Alexander, 1992; Healey, 1999; Innes, 1995). In the collaborative planning context, planning is understood as “a governance activity occurring in complex and dynamic institutional environments, shaped by wider economic, social and environmental forces that structure, but do not determine specific interactions” (Healey, 2003, p. 104). In other words, governance is the process of policy formulation and implementation characterised by multi-actor networks of cross-sectoral coalitions and partnerships (Lambert & Oatley, 2002; Rydin, 2010; Schmitt & Danielzyk, 2018; van Bueren & ten Heuvelhof, 2005). However, as several planning scholars highlight, the shift towards governance is also shaped by the influence of neoliberal interests, globalisation, and an increased market-based logic on planning (Leffers & Wekerle, 2020; Mäntysalo & Bäcklund, 2017; Schmitt & Danielzyk, 2018). This makes governance not inherently more democratic or inclusive and can lead to decisions that bypass public accountability and risk serving the interests of powerful actors, reinforcing neo-liberal priorities over democratic ideals (Bäcklund et al., 2018).

In planning, government structures often remain in place, but coexist with governance approaches (Mäntysalo & Bäcklund, 2017; Rydin, 2010) with decision-making being distributed across multiple levels of government, within a system of interconnected relationships (Schmitt & Danielzyk, 2018). Different modes of governance exist simultaneously, as different issues cut through scales, policy sectors, interests, and contexts (Bulkeley & Kern, 2006). This governance context is often referred to as multi-level governance, which originated in the understanding of EU policymaking since the early 1990s (Bache et al., 2023; Pierre, 2019). Multi-level governance implies that governance “takes place through processes and institutions operating at, and between, varieties of geographical and organisational scales involving a range of actors with different forms of authority” (Duit & Galaz, 2008, p.

318). Local activities must be understood within larger contexts at broader scales since planning, decision-making, and implementation take place on different levels and in non-linear ways (Bache et al., 2023; Healey et al., 2002a). Rydin (2010) describes this context as “an overlapping patchwork of networks and partnerships” (p. 52).

These hybrid and multilevel governance settings, where formal government structures coexist with more flexible, collaborative arrangements, can challenge legitimacy in planning (Mäntysalo et al., 2015; Rydin, 2010; Salet & de Vries, 2019). Legitimacy refers to ensuring accountability, inclusiveness, openness, transparency, and fairness of decision-making processes and outcomes (Eneqvist et al., 2022; Mäntysalo et al., 2015). As Taylor (2019) notes, legitimacy is “a stock that can be expanded or diminished” (p. 214). Based on earlier work by other scholars, Taylor (2019) presents the Scharpf-Schmidt legitimacy framework, which helps break down legitimacy into three dimensions:

- Input legitimacy: the quality of public participation in goal setting
- Throughput legitimacy: the quality of governance processes and implementation procedures
- Output legitimacy: the quality and effectiveness of planning outcomes.

Mäntysalo & Bäcklund (2017) emphasise the importance of recognising the institutional foundations of government, laws, administrative structures, and political culture, even as governance practices expand. A central question is determining who holds power, who governs, and who is accountable. Bäcklund et al. (2018) stress that planning has always involved questions of inclusion and exclusion, and that clarifying roles and responsibilities is key to maintaining legitimacy. Although governments often initiate planning, they rely on the involvement and compliance of other actors, particularly developers, to realise plans and policies (Rydin, 2010; Taylor, 2019).

Previous research has found that the roles of actors, especially local governments and developers, are crucial in shaping planning processes and outcomes (Brokking et al., 2020; Candel & Paulsson, 2023; Creagh et al., 2019; Kågström, 2020; Kalbro et al., 2015; Spit, 2025). These roles and the corresponding responsibilities and mandates are not fixed but shift throughout development processes (Brokking et al., 2020; Hamdan, Andersen, et al., 2021; Karrbom Gustavsson et al., 2023; Spit, 2025). Local governments may act as initiators, regulators, facilitators, promoters, or even

partners, depending on the stage and structure of the project (Hagbert & Malmqvist, 2019; Karrbom Gustavsson et al., 2023; Salet & de Vries, 2019; Storbjörk et al., 2019). Developers develop and exploit land and properties as their core business, often significantly influencing urban development (Buitelaar et al., 2025; Leffers & Wekerle, 2020; Zakhour & Metzger, 2018). Developers are often perceived as a homogeneous group; however, several studies have highlighted significant variations in their motives, approaches, and strategies (Adams et al., 2012; Coiacetto, 2001; Coiacetto, 2000; Hedborg & Rosander, 2023; Meijer & Buitelaar, 2023). Spit (2025) notes that planning is a *balancing act* between public and private interests, with actors' roles and influence changing over time.

In this thesis, I use the concept of governance arrangements, which refer to the evolving configurations of actors, relationships, and decision-making processes involved in urban planning (Oldbury & Isaksson, 2021; Oliveira & Hersperger, 2018). They include formal and informal institutional structures that shape how planning instruments are applied (Devecchi, 2013; Hodson et al., 2017; Peacock & Allmendinger, 2021). Governance arrangements are not static; they are dynamic, relational, and continually reconfigured in response to changing political, institutional, and socio-economic conditions (Parks, 2019). They determine how actors collaborate, decisions are made, and responsibilities are distributed and evolve (Devecchi, 2013; Oldbury & Isaksson, 2021). Within governance arrangements, different combinations of planning instruments can be used to achieve planning goals (Adams & Tiesdell, 2012; Rydin, 1998; Silva & Acheampong, 2015; Stead, 2021). Stead (2021) distinguishes between substantive instruments, which directly affect the delivery of policy outcomes (such as zoning regulations or design codes), and procedural instruments, which affect the process and procedures of developing policy (such as environmental impact assessment and participatory processes), applied across plan-making, development control, and plan enforcement stages – each requiring different tools often used in combination. The selection and application of planning instruments are influenced by the local institutional context, governance modes, and how problems and solutions are framed (Petersen & Heurkens, 2018; Stead, 2021). Following Puustinen et al. (2025), understanding the effectiveness of these instruments requires attention to their interactions, the stages of the planning processes, and the broader policy context.

2.2 Sustainable urban development and experimentation

As described in Chapter 1, sustainable urban development projects refer to geographically bounded initiatives through which broad sustainability ambitions are translated into context-specific urban planning and design actions (Fitzgerald & Lenhart, 2016; Rapoport, 2018). These projects are inherently plural and dynamic, shaped by different interests, political priorities, and institutional contexts, and are best understood as long-term, multi-actor processes through which sustainability is continuously negotiated and practised (Hallin et al., 2021; Metzger & Lindblad, 2020; Karrbom Gustavsson et al., 2023).

Research on sustainable urban development has grown considerably, yet findings consistently point to an implementation gap between ambitious sustainability goals and project outcomes (Brokking et al., 2020; Hamdan, de Boer, et al., 2021; Hedborg & Rosander, 2023; Hodson et al., 2018; Holmstedt et al., 2017; Krueger, 2023; Pandis Iverot & Brandt, 2011). Explanations for this gap emphasise fragmented governance arrangements, shifting responsibilities, weak accountability, and the difficulty of consistently integrating sustainability across planning phases (Hamdan, de Boer, et al., 2021; Holmstedt et al., 2017; Karrbom Gustavsson et al., 2023; Nielsen et al., 2019).

Experimental approaches have emerged as a central planning mode for sustainable urban development in response to these challenges. Through pilot projects, living labs, testbeds, and demonstration projects, experimental approaches create dedicated spaces to test new solutions, policy goals, governance arrangements, and actor relationships (Evans & Karvonen, 2014; Högström et al., 2021; Karvonen, 2018; Parks, 2019). Experimentation offers more flexible and context-sensitive planning approaches that allow cities to innovate, adapt, and learn in practice (Hellquist et al., 2025; Karvonen, 2018; Scholl & de Kraker, 2021). Bulkeley (2023) highlights four dynamics that explain the growing reliance on experimentation: the redistribution of governing authority, the changing relationship between knowledge and policy, the challenge of acting under indeterminacy, and the shifting meaning of progress in a climate-altered world. Rather than reducing complexity, experimentation often deliberately engages with uncertain and messy conditions to generate new insights and potential pathways for action.

Experimentation is explored across various research fields, including transition studies, climate governance, and urban planning (Schreiber et al., 2023; Sharp & Raven, 2021). In urban planning, it is not a new phenomenon. Caprotti & Cowley (2017) argue that the idea of the city as an experimental site has deeper historical roots, tracing back to modernist and utopian projects such as Garden Cities, which sought not only to reimagine urban form but also to bring about wider societal change. These early projects can be seen as transitional in purpose, laying a foundation for contemporary agendas of sustainable urbanisation and experimental urbanism (Caprotti & Cowley, 2017). Similarly, Karvonen & van Heur (2014) trace the language and logic of experimentation to the early 20th century with the Chicago School sociologists, while Healey et al. (2003) documented widespread policy experimentation across Europe and North America in the early 2000s. These initiatives introduced new ways of thinking and acting in community development, spatial strategy, and environmental planning, but their influence on mainstream governance has often remained limited, raising questions about their transformative potential and capacity “to shift the discourses and practices of the ‘mainstream’” (Healey et al., 2003, p. 62).

Today, these questions raised by Healey et al. (2003) remain central to the debate, concerning whether experimentation should lead to mainstream change through scaling, or be regarded as a permanent mode of governance (Ehnert, 2023; Roggero, 2025; Sharp & Raven, 2021; Torrens & von Wirth, 2021). Transition and innovation studies often frame experiments as isolated innovations that gain transformative power when scaled up into broader systems (Ehnert, 2023). Roggero (2025) identifies four pathways for such scaling: growth, replication, multiplication, and institutionalisation. In contrast, governance and policy scholars argue that experimentation is best understood as an ongoing practice of governance, where systemic change arises not only from scaling but also from ongoing and iterative experiments that gradually reshape governance and socio-technical systems (Bulkeley, 2023; Ehnert, 2023; Karvonen, 2018). From this perspective, scaling is not rejected but redefined, prioritising learning and adaptation over fixed institutionalisation (Roggero, 2025).

In line with the discussion on the roles of local governments in Section 2.1, previous research on experimentation has pointed out that experimentation often transforms the role of local government from a hierarchical structure with clearly defined responsibilities to a more horizontal and collaborative model in which responsibilities are shared and fluid (Eneqvist & Karvonen, 2021).

Haderer (2023) highlights the risk that experimentation may sideline the role of (local) governments in governing climate change. When responsibility is distributed among different actors, public accountability can be undermined without sufficient alignment with formal political mandates or overarching policy goals. Similar concerns are raised by Torrens & von Wirth (2021), who argue that decentralising decision-making through experimentation often leads to reduced accountability. Several scholars have highlighted the risk that experimentation may undermine the democratic responsibilities of public authorities and weaken the legitimacy of urban planning processes (Berglund-Snodgrass & Mukhtar-Landgren, 2020; Eneqvist et al., 2022; Isaksson et al., 2022; Kronsell & Mukhtar-Landgren, 2018). Without clear connections to existing planning and governance systems, experimental initiatives risk becoming isolated or parallel efforts (Isaksson et al., 2022). This can lead to a situation of *organised irresponsibility*⁵, when different actors engage in open-ended learning and innovation, but no one is held accountable for outcomes or continuity (Haderer, 2023; Torrens & von Wirth, 2021). Healey et al. (2003) found that urban planning experiments are most effective when aligned with existing governance arrangements. Similarly, Hodson et al. (2017) argue that the outcomes of experiments are shaped not only by local dynamics but also by the broader institutional context in which they are situated. Understanding how cities evolve through experimentation thus requires close attention to the interactions between different governance forms, which may conflict, coexist, or complement one another (Hodson et al., 2017). To better understand these dynamics, Eneqvist et al. (2022) emphasise the importance of tracing experiments from design through implementation, focusing on how legitimacy is practised throughout these processes.

2.3 An overview of sustainable urban development in Sweden

Nilsson (2013) provides an overview of how environmental and sustainability concerns have evolved within Swedish planning, from early environmental regulations in the 1940s and 1950s, such as water quality laws and the Shore Protection Act, through the 1970s oil crisis, which gave rise to energy-

5 Initially introduced by Beck (1995), the term *organised irresponsibility* describes the disconnection between the causes of harm and the attribution of accountability. In this thesis, I draw on the concept as it is reinterpreted by Haderer (2023) and Torrens & von Wirth (2021) in the context of experimentation, where it highlights how experimental forms of governance may unintentionally allow public authorities to withdraw from responsibility by diffusing agency across diverse actors and processes.

saving initiatives and research into alternative energy sources. The 1980s saw growing interest in ecology and biodiversity, and the 1987 Brundtland Report introduced the global concept of sustainable development. That same year, Sweden adopted the Planning and Building Act, which decentralised planning authority to local governments. In the 1990s, sustainability concerns gained momentum, influenced by the 1992 Rio Conference and Agenda 21. Environmental impact assessments became mandatory for detailed development plans in 1994 and EU membership in 1995 led to the adoption of additional environmental and nature protection legislation (Nilsson, 2013).

Environmental policy became more systematised with the introduction of an Environmental Quality Objectives System in 1999, comprising an overarching goal, 16 environmental quality objectives, and several milestone targets. Building on this framework, the Climate Act (2018) established the long-term goal of achieving net-zero greenhouse gas emissions by 2045, followed by net negative emissions in the decades thereafter (Karlsson, 2021). Also in 2018, the Policy for Designed Living Environment was adopted, establishing a comprehensive national architecture policy that promotes sustainable, high-quality, and equitable living environments. More recently, the 2025 National Strategy for Urban Development set out a goal and identified thirteen focus areas for urban development policy (Regeringen, 2025). Its overarching aim is for Swedish cities, based on their local conditions, to develop into vibrant, safe, and resilient living environments where people enjoy spending time. The strategy also states that Sweden aspires to be a leading nation in the sustainable development of attractive cities (Regeringen, 2025). These national objectives and strategies provide the context that guides local governments and urban development projects in translating sustainability ambitions into local action.

From 1998 onwards, the Swedish national government introduced financial support schemes and initiatives to promote sustainable urban development at the local level (Lundström, 2013). Early initiatives included the Local Investment Programme (1998–2002), which helped local governments collaborate with local businesses and organisations to reduce environmental impacts by adopting energy- and resource-efficient technologies (Mahzouni, 2015). Later programmes included the Climate Investment Programme (2003), the Building-Living Dialogue (2004), and the Delegation for Sustainable Cities (2008), all aimed at providing opportunities to trial sustainability innovations and develop integrated sustainability solutions

(Smedby & Neij, 2013; Williams, 2016). More recently, the Council for Liveable Cities (previously the Council for Sustainable Cities), established in 2017, supports local governments and plays a central role in the implementation of the new national strategy for urban development from 2025.

Sweden's most well-known sustainable urban development projects are Hammarby Sjöstad in Stockholm and Western Harbour in Malmö. The planning and development processes of these projects have attracted international attention from both researchers and practitioners, and they are widely regarded as exemplary practical initiatives in sustainable urban planning (Holgersen, 2023; Hult, 2015; Mahzouni, 2015), initiated in the 1990s with support from national programmes such as the Local Investment and Climate Investment Programmes, and the Delegation for Sustainable Cities (Lundström, 2013; Nilsson, 2013). In these urban

Table 1

Overview of sustainable urban development projects in Sweden, sorted chronologically. The selection of sustainable urban development projects presented is based on the cases examined in the articles included in Paper 1, which is a literature review of research published between 2003 and 2022. In total, 70 articles were included in the review, covering research on 13 sustainable urban development projects in Sweden.

Local government	Sustainable urban development project	Timeframe	Functions
Stockholm	Hammarby Sjöstad	1992 - 2020	Mixed use, 12,700 dwellings
Malmö	Western Harbour, including <i>Bo01</i>	1998 - ongoing	Mixed-use, 10,000 dwellings
Gothenburg	Kvillebäcken	2004 - 2019	Mixed-use, 2000 dwellings
Växjö	Östra Lugnet	2007 - 2022	Mainly residential, 750 dwellings
Malmö	Hyllie	2007 - ongoing	Mixed-use, 9000 dwellings
Stockholm	Stockholm Royal Seaport (<i>Norra Djurgårdsstaden</i>)	2008 - ongoing	Mixed-use, 12,000 dwellings
Lund	Brunnshög	2009 - ongoing	Mixed-use, 6000 dwellings
Linköping	Vallastaden	2011 - ongoing	Mixed-use, 1800 dwellings
Kiruna	New city center	2012 - ongoing	Mixed-use, 3000 dwellings
Uppsala	Östra Sala backe	2014 - ongoing	Mixed-use, 2500 dwellings
Malmö	Sege Park	2015 - ongoing	Mixed use, 1000 dwellings
Växjö	Torparängen	2017 - ongoing	Residential, 300 dwellings
Borlänge	Jakobsgårderna	2017 - ongoing	Mainly residential, 1200 dwellings

development projects, innovative technologies, integrated system models, policy instruments, and new forms of collaboration were tested. Hammarby Sjöstad introduced the eco-cycle Hammarby Model (Pandis Iverot & Brandt, 2011), while Western Harbour focused on resource and energy efficiency (Medved, 2017). Inspired by these projects, many Swedish local governments have developed sustainable urban development projects over the last decades (Candel, 2022), summarised in Table 1.

These sustainable urban development projects often relate to a longer Swedish tradition of using housing exhibitions as platforms for innovation in planning and building. Since 1925, housing exhibitions have served as experimental sites for demonstrating new ideas in architecture and urban design. Examples include the first exhibition *Bygge och Bo* in Lidingö (1925), the Stockholm exhibition (1930), *Bo Bättre* in Gothenburg (1945), *H55* in Helsingborg (1955), *Bo93* in Karlskrona (1993), *Nordisk Bostadsutställning* in Borås (1994), and *H99* in Helsingborg (1999). Parts of Western Harbour (*Bo01* in 2001) and Hammarby Sjöstad (*Hammarby Sjöstad 2002*) were developed as housing exhibitions, showcasing sustainable building and planning solutions, and served as demonstration projects with international reach (Austin, 2013; Glad & Gramfält, 2019; Hult, 2013). The recent exhibition *Vallastaden 2017* in Linköping is a part of one of the case studies in this thesis.

2.4 The Swedish planning context

Sweden has a long tradition of a decentralised planning system in which the 290 local governments hold a planning monopoly, giving them the authority to decide when, where, and how urban development takes place within their municipal boundaries (Brokking et al., 2020; Högström et al., 2019; Kågström, 2020; Kalbro, 2013). Planning is regulated in the Planning and Building Act (*plan- och bygglagen*), which contains two types of plans on a municipal level: the comprehensive plan (*översiktsplan*) and the detailed development plan (*detaljplan*). The comprehensive plan covers the entire municipal area. It presents the basic characteristics of the intended use of land and water areas, how the built environment is to be used, developed, and preserved, and compliance with national interests, as well as national

and regional goals⁶. The detailed development plan provides legally binding regulations for land use and construction in specific areas. Although several documents support the detailed plan, only the plan map is lawfully enforceable. Detailed development plans are usually drawn up when new development involves one or several properties. The Planning and Building Act allows flexibility in adapting plans to local conditions. Building permits, supervised by the local government, must comply with Swedish building regulations (*Boverkets byggregler, BBR*) and the detailed development plan, with different control stages from application to final clearance (Wahlström et al., 2020).

Quality and design programmes

In addition to formal planning instruments, Swedish local governments often use complementary quality and design programmes to guide both the design and sustainability of specific urban development projects (Kalbro et al., 2015). These programmes - sometimes called architectural programmes, design manuals, or environmental and sustainability programmes – outline project-specific expectations and are often developed in collaboration with developers and other actors (Austin, 2013; Holmstedt et al., 2017; Parks, 2019). While they are not legally binding unless incorporated into detailed development plans, these programmes are frequently included in land allocation processes (Högström et al., 2019). The influence of quality and design programmes varies, and previous research has highlighted weak governance structures, unclear responsibilities, and limited enforcement as key obstacles to achieving sustainability goals through these instruments (Holmstedt et al., 2017; Kalbro et al., 2015; Parks, 2019). Between 1997 and 2011, several local governments introduced programmes with explicit sustainability requirements applicable to all new urban developments in their municipality (Smedby, 2020). Today, Stockholm and Gothenburg maintain

6 Municipal energy plans, required under the Energy Planning Act, are closely linked to comprehensive planning, as they identify spatial needs such as land for electricity infrastructure and energy-intensive activities (Wretling et al., 2018). Several local governments also have formulated climate or sustainability strategies at the municipal level, often connected to their energy plans (Gustafsson et al., 2015). While these municipal level plans provide important context and are occasionally referred to where relevant, they primarily address higher-level implementation rather than specific urban development projects and therefore fall outside the scope of this thesis.

such programmes, whereas earlier initiatives in other local governments have been discontinued⁷ (Smedby, 2020).

Land allocation processes

Next to using the plans defined in the Planning and Building Act and quality and design programmes, Swedish local governments have a long tradition of using public land ownership as a planning instrument in urban development (Granath Hansson, 2025; Olsson, 2018). A significant share of new urban development projects occurs on municipally owned land (Kalbro, 2013). In 2024, 285 local governments reported owning land suitable for housing development (Boverket, 2024). Through land allocations, local governments grant a developer the exclusive right to negotiate the purchase or lease of municipal land for a limited time under specified conditions. Three main types of developers are present in Sweden: those who build to use, those who build to manage, and those who build to sell, and they can be private or public. In some cases, organisations separate the function of developing new buildings from the long-term management of their property portfolios. In addition to these more traditional developers, building communities where future residents collectively develop housing for their own use have become increasingly common in Sweden in recent years. However, they still represent a small share of the total housing stock.

Land allocation agreements are civil contracts, not regulated by the Planning and Building Act, and typically outline both general conditions (e.g., timelines and financial responsibilities) and project-specific requirements (e.g., housing tenure, energy performance, or sustainability certifications) (Caesar, 2016). Land allocation often precedes or runs parallel to detailed development planning, with varying degrees of developer involvement (Brokking et al., 2020; Högström et al., 2023). Land allocation can occur through four common procedures: direct, bid, comparative bid, and competition (Candel & Paulsson, 2023; Högström et al., 2023; Kalbro, 2013). *Direct land allocation* means a single developer is granted the land allocation without considering other proposals or competitors. A land allocation procedure based on *bids* means that developers compete based on predefined criteria and requirements, with price being the determining

7 Examples of local programmes with sustainability requirements include: Gothenburg - *Program för miljöanpassat byggande* (2009, 2018); Kungälv - *Miljöprogrammet för bostäder* (2011); Malmö, Lund, Lomma, and Helsingborg - *Miljöbyggprogram SYD* (2009, 2012); Stockholm - *Program för ekologiskt byggande* (1997), *Program för Miljöanpassat byggande* (2005, 2012), *Hållbarhetskrav vid byggande på stadens mark i Stockholm* (2017, 2021, 2024).

factor. A procedure based on a *comparative bid* is similar to the bid procedure but incorporates additional quality considerations where the price is not decisive. Finally, the *competition procedure* involves evaluating more advanced design proposals focusing on architectural or sustainability qualities (Candel & Paulsson, 2023; Högström et al., 2023; Kalbro, 2013). Local governments sometimes lease land through the site leasehold system (*tomträtt*) instead of selling, generating annual ground rents. This system is currently under debate due to concerns about rising leasehold costs. Land allocation processes are complex, and the degree of municipal control and developer negotiation shape how sustainability objectives are implemented (Granath Hansson, 2025; Krigsholm et al., 2022).

Limits on local requirements since 2015

Since 2015, a legal reform has restricted Swedish local governments' ability to impose local technical requirements (*särkrav*) on building projects. Under the Planning and Building Act (PBL 2014:900, Chapter 8, Section 4a), local governments may not set technical building standards beyond national regulations, except in limited situations, such as when they act as landowners or developers. This reform was intended to ensure uniformity and predictability, and to avoid increased construction costs associated with inconsistent local rules (Boverket, 2024). Despite this legal restriction, many local governments continue to include these requirements in land allocation processes. A 2024 survey by Boverket found that 96 local governments reported using requirements in land allocation, primarily linked to development timelines, design principles, and, in some cases, social and environmental sustainability (e.g., energy performance, environmental certifications, and affordable housing) (Boverket, 2024), confirming findings from earlier research (Candel & Törnå, 2021; Francart et al., 2019; Smedby, 2020). Local governments can legally set technical requirements in the following cases:

- To ensure land suitability (e.g., soil contamination, accidents, flooding risks);
- Design-related requirements (height and architectural design) within detailed development plans;
- When acting as a developer;
- When retaining land ownership (e.g., via site leasehold);
- Land sales or allocations are not tied to implementing a detailed development plan (Boverket, 2025).

This means that when local governments allocate land linked to a detailed development plan and intend to transfer ownership, they are not permitted to include stricter technical building requirements. Despite this, local governments still include sustainability requirements in land allocation contracts with developers since these contracts fall outside the scope of public administrative law (Francart et al., 2019; Olsson, 2018). Using land allocation agreements as regulatory tools allows local governments to promote sustainability, but it can also blur the line between public planning and private development, sidelining public participation and raising concerns about legal uncertainty and the legitimacy of the planning system (Olsson, 2018). The issue has not yet been tested in court, so there is no clarification yet on the extent of what local governments can or cannot impose in land allocation contracts. Some argue that if the local government and the developer agree, the local government can set extra demands. Several local governments use outcome-based requirements, focusing on sustainability goals rather than prescribing technical solutions, an approach that may fall outside the legal prohibition. Brokking et al. (2020) highlight that more research is needed to better understand this duality and the interactions between the statutory frameworks in meeting sustainability goals.

2.5 Multilevel governance of energy policies in the built environment

The ways in which energy policies are applied through planning make them an instructive example for understanding the implementation of sustainability goals in urban development projects (Petersen & Heurkens, 2018). At the same time, they provide a clear example of multilevel governance, as frameworks and initiatives from the EU and national governments shape local outcomes (Björklund et al., 2023; Kern et al., 2017; Rosenow et al., 2016).

The building sector accounts for approximately 40 % of the EU's final energy use and 34 % of its energy-related greenhouse gas emissions (European Environment Agency, 2024). In Sweden, the residential and service sector is the largest energy-using sector, responsible for around 40 % of total national energy use (Swedish Energy Agency, 2025). More than half of this energy is used for space heating and domestic hot water (Swedish Energy Agency, 2025). To reduce energy demand, increase efficiency, and integrate more renewable energy in the built environment, a wide range of policy strategies have been introduced across different governance levels (Björklund et al.,

2023; Kern et al., 2017; Rosenow et al., 2016). Within this broad policy area, three distinctions are often made: (1) new or existing buildings, (2) residential or non-residential buildings, and (3) space heating and cooling or other energy uses (Fawcett & Topouzi, 2021). This thesis focuses on energy policies for new residential buildings, including space heating and cooling and electricity use in building operations. The remaining discussion of energy policies will therefore be limited to this context.

Since the 1980s, the EU has implemented policies and programmes to improve energy efficiency in buildings. Early EU measures included the Construction Products Directive (1989), the Boiler Directive (1992), and the SAVE Directive (1993) (Economidou et al., 2020). From 2000 onwards, several action plans and programmes addressing energy efficiency in the built environment were published. The first comprehensive EU legal act on energy policy for buildings was the EPBD in 2002, with recasts/amendments in 2010, 2018, and 2024, including energy performance requirements for new buildings (Economidou et al., 2020). Complementing the EPBD, the Energy Efficiency Directive (EED, 2012, amended 2018 and 2023) sets broader requirements to achieve national energy reduction targets across all sectors. In addition, the EU Taxonomy (2020) establishes technical screening criteria that define which economic activities in the construction and real estate sector can be considered environmentally sustainable. This framework helps guide investments in new construction and energy-efficient renovation, and supports the EU's climate and energy objectives.

The EPBD is the core EU policy targeting the new and existing building stock. The EPBD requires member states to apply MEPR to new and existing buildings (Smedby, 2020). EPCs have been developed as a core tool in the EPBD to improve energy efficiency, decrease energy use, and provide more transparency on building energy use (Pasichnyi et al., 2019). EPCs are “a concise document displaying the energy performance of a building or building unit – based on an energy class or continuous scale rating system – together with recommended actions on how to improve the existing energy performance” (Economidou et al., 2020, p. 8). Energy performance is often defined as the calculated or monitored energy use of a building. In 2010, a recast of EPBD was published to ensure that national MEPRs were more aligned regarding energy saving and reduction of greenhouse gas emissions (Economidou et al., 2020). The concept of nearly zero energy building (NZEB) was also introduced in the recast for new buildings. In 2018, the EPBD was revised again, focusing more on the existing building stock. In

2024, a new recast of the EPBD was published (European Union, 2024), which states that all new buildings should be zero-emission buildings by 2030, with very high energy performance, requiring zero or a very low amount of energy. Although building energy performance regulation has been in place in several EU member states for a long time, previous research argues for more policy monitoring, verification, and evaluation to provide further insight into how MEPRs for new buildings are implemented and enforced over time, understanding the implications of a more stringent MEPR (Fawcett & Topouzi, 2021; Rosenow et al., 2016; Thomas & Rosenow, 2020).

Next to energy performance regulations from the EU, a wide range of policies, incentives, and programmes initiated by non-governmental and private actors also influence energy efficiency in new buildings (Björklund et al., 2023). These include certification and classification systems at the building and district level, such as BREEAM, LEED, and DGNB; information and knowledge dissemination initiatives, like the World Green Building Council; and financing instruments, such as green loans provided by banks (Björklund et al., 2023; van der Heijden, 2016). Increasingly, governments integrate or mandate the use of these instruments, turning them into what van der Heijden (2016) terms accelerator and bridging instruments, for example, by requiring certification as part of planning processes (Gustafsson & Andréén, 2018; van der Heijden, 2016). These instruments increasingly align with EU frameworks such as the EU Taxonomy and the EPBD.

In Sweden, since the 1950s, instructions and non-binding regulations for insulation for new buildings have been in place (in BABS, an early set of technical building regulations). From the 1970s onwards, energy requirements addressing buildings have been in place through national building codes, first only for specific components, then to overall performance-based codes focusing on thermal performance and later in terms of annual energy use (Smedby, 2020). Influenced by the EPBD, Sweden incorporated energy regulations for new buildings in its national building regulations from 2006 onwards (Mahapatra, 2015). The leading indicator for determining energy performance in Sweden is the primary energy number of a building (in kWh/m² per year). The primary energy number consists of the building's energy use, where energy for heating has been adjusted with a geographical correction factor, multiplied by a weighting factor for energy carriers, and divided by the heated floor area (kWh/m² per year). The current maximum permitted energy performance expressed as a primary energy number is given

Table 2

Maximum permitted primary energy number for single-family houses, multi-family buildings, and non-residential premises as defined in the Swedish building regulations (BBR 31).

Type of building	Heated floor area	Maximum permitted energy performance expressed as primary energy number (in kWh/m ² per year)
Single-family house	>130 m ²	90
	>90–130 m ²	95
	>50–90 m ²	100
	≤50 m ²	No requirement
Multi-family building		75
Non-residential premises		70
Non-residential premises ≤50 m ² heated floor area		No requirement

in Table 2. As discussed in the previous section, several local governments have introduced local programmes with sustainability requirements for new buildings, often including energy performance requirements. Smedby (2020) found that these local programmes have influenced the formulation of subsequent national regulations.

Alongside governmental efforts, Sweden also has various non-governmental and private initiatives addressing energy in the built environment. Research into low-energy buildings has been very influential. In the 1970s and 1980s, several experimental low-energy or passive houses were built in Sweden, and a Passive House Centre was established (Niskanen & Rohrer, 2022). These projects and initiatives led to a Swedish passive house standard in the early 2000s, managed by FEBY (*Forum för Energieffektiva Byggnader*) (Niskanen & Rohrer, 2022). In 2009, a less radical standard and broader certification system for sustainable buildings was developed, *Miljöbyggnad*, currently managed by the Swedish Green Building Council (Wallhagen et al., 2023). This is Sweden's most common building certification system (Wallhagen et al., 2023). Other systems used are *Svanen* and the international systems BREEAM and LEED. The indicators used in *Miljöbyggnad* for energy are heat power demand, solar thermal load, energy use, and renewable energy. The *Miljöbyggnad* system is based on Swedish building regulations for energy use. Recently, a new certification system for the district level has been developed, Citylab, which also includes requirements for energy

(Gustafsson & Andréen, 2018). In addition to certification systems, different collaboration platforms for energy-efficient buildings are established in Sweden, involving market actors, research, and governments, e.g., *LÅGAN* and *BeBo*, all (co)financed by the national government.

Urban development projects have gained increasing attention as a strategic tool for implementing energy policies (Björklund et al., 2023; Petersen & Heurkens, 2018; Rydin, 2010). New decentralised energy-generation technologies are seen as beneficial as “they increase local energy production, bolster energy supply security, and reduce transmission losses”, and also provide a potential “to empower and engage local communities” (Kojonsaari & Palm, 2021, p. 1). The EU is promoting local energy concepts like LECs and PEDs to reach the energy and climate targets (Kojonsaari & Palm, 2021). These initiatives address local challenges and characteristics while often providing alternative economic energy models. In LECs, different actors, including households, businesses, third-sector organisations, and local governments, develop decentralised energy systems, virtual power plants, or (non-commercial) energy exchange (Bonfert, 2024; Kojonsaari & Palm, 2021). PEDs are districts “with annual net zero energy import, and net zero CO₂ emission working towards an annual local surplus production of renewable energy” (JPI Urban Europe, 2020, p. 5). In PEDs, the local energy system is characterised by energy efficiency, renewable energy generation, energy storage, flexibility, and energy sufficiency, requiring integration between the buildings and the district or neighbourhood level (Erba & Pagliano, 2021).

CHAPTER 3

Theoretical approach

In this chapter, I present the theoretical approach and key analytical concepts used in this thesis. The research is grounded in urban planning theory, a field that encompasses knowledge, professional practice, and politics, shaping both public and private decision-making about urban life (Teitz, 2007). Within this broad field, collaborative planning theories, developed around the 1990s, play a central role (Alexander, 1992; Healey, 1999; Innes, 1995). I draw on these theories to highlight the significance of institutional structures and the dynamic interactions between actors and institutions, understanding planning as an interactive and socially embedded process (Næss, 2023).

The primary theoretical framework guiding this thesis is Healey's concept of institutional capacity building, which I use to explore how institutional structures can enable or constrain planning efforts, and how actors can build capacity to support sustainable urban development projects. The institutional perspective on urban planning is further introduced in the first part of this chapter. In Section 3.2, the framework of institutional capacity building is discussed in detail. The middle-out perspective is presented in Section 3.3, which is used as a complementary analytical lens.

3.1 Approaching urban planning from an institutional perspective

In the 1990s, a shift toward a new institutionalist approach in urban planning led to the development of collaborative planning theories (Alexander, 1992; Healey, 1999; Innes, 1995). New institutionalism, which emerged in the 1970s, has its roots in a broad range of social science disciplines, including political science, economics, organisation theory, management studies, and sociology (Kim, 2012; Scott, 2008; Taylor, 2013; Teitz, 2007). Collaborative planning theory is influenced by American pragmatism, sociological

institutionalism, and interest-based negotiation and alternative dispute resolution (Westin, 2022) with Habermas's theory of communicative action serving as a common source of inspiration. This thesis draws on Healey's work within the European institutional tradition, as it provides a framework well suited to the governance structures, planning cultures, and institutional arrangements commonly found in northern European contexts, including collaborative and multi-level governance models (Westin, 2022). This stream of collaborative planning theory was developed through a merger between the sociological and institutional tradition (Giddens) and the new generation of critical theory (Habermas). Healey was one of the leading scholars, taking a relational perspective by focusing on how "planning cultures, infused by expert rule and top-down power, could be transformed through agency in the micro practices of planning" (Westin, 2022, p. 135). Healey (2006a) advocates "a relational approach to understanding urban and regional dynamics, which emphasises the multiplicity of the webs of relations which transect a territory and the complex intersections and disjunctions which develop among them" (p. 526).

Giddens' theory of structuration has been foundational in understanding institutional dynamics in urban planning (Healey, 2003). The theory highlights the reciprocal relationship between structure and agency, illustrating how actors shape governance processes even as they are simultaneously influenced by institutional contexts (Healey, 2003). From this perspective, institutions can both enable and constrain action. They are broadly defined as "multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources" (Scott, 2013, p. 57) or as "man-made structures that guide and give meaning to human interaction" (Buitelaar et al., 2014, p. 249). As Taylor (2013) puts it, institutions can act as "causal variables that structure the opportunities and constraints faced by individual and collective actors" (p. 684). In urban planning, institutions such as governments and markets provide the frameworks within which planning decisions are made and implemented (Verma, 2007). Institutions are expressed through both formal and informal structures. Formal institutions include legally enforced rules like constitutions, laws, ordinances, and land-use plans (Buitelaar et al., 2014; Lawrence & Suddaby, 2006). Informal institutions refer to unwritten norms, traditions, values, and behavioural codes that influence actor relationships (Buitelaar et al., 2014; Coaffee & Healey, 2003; Lawrence & Suddaby, 2006).

Institutions are not static. They evolve through ongoing interactions between actors, leading to variations across spatial and temporal contexts (Taylor, 2013). As Buitelaar et al. (2014) note, urban development is the product of this dynamic interplay between actors and institutions. This reciprocity between actors and institutions has become known as the *duality of structure* (Giddens, 1984). Kim (2012) identifies two key contributions of the institutional perspective to urban planning. First, its focus on the socially constructed nature of institutions helps explain why institutional arrangements differ across contexts. Second, because institutions are constructed through social processes, they can also be reconfigured, opening possibilities for change. In this light, effective coordination among actors, mediated through institutions, is essential to achieving planning goals such as sustainability (Kim, 2012).

Alongside Giddens' structuration theory, Habermas' theory also significantly contributed to institutional approaches in urban planning. Habermas' discourse ethics and communicative rationality concepts offer insight into how collaborative dialogue influences planning processes. Both Giddens and Habermas emphasise the importance of active agency within structures and highlight the role of communicative interaction in shaping governance arrangements (Healey, 2006b). The rationale for collaborative planning lies in its potential to build institutional capacity, specifically by enhancing the ability of place-focused actors to influence the development and quality of the place (Healey, 1998). To evaluate planning processes, scholars have adopted the concept of institutional capacity building (Healey, 1998; Innes & Booher, 2002; De Magalhães et al., 2002). Institutional capacity refers to the strength of relational networks and the quality of interactions among actors in a particular place to address societal challenges collectively (Healey, 2006b). This capacity is co-produced through dynamic exchanges between individuals, organisations, and institutions operating at multiple levels (De Magalhães et al., 2002). Sorensen (2025) highlights the increasing relevance of Healey's work today, which is also reflected in the growing application of Healey's institutional capacity building framework in recent studies on experimental and innovative planning practices (Čolić et al., 2022; Dai & de Vries, 2018; Eneqvist, 2022; Isaksson & Hagbert, 2020; Isaksson & Heikkinen, 2018; Kusters et al., 2025; Smedby & Neij, 2013; Sondal et al., 2024; Trygg & Wenander, 2022; Witzell & Oldbury, 2023; Wretling & Balfors, 2021).

3.2 Institutional capacity building

Within urban planning, institutional capacity building is understood as “enhancing the ability of place-focused stakeholders to improve their power to ‘make a difference’ to the qualities of their place” (Healey, 1998, p. 1541). This involves actively developing intellectual, social, and political capital to “promote long-term and sustainable improvements to material quality of life and the sense of identity and well-being of people in places” (Healey, 1998, p. 1544), “the ability of the institutional relations to work collectively towards the creation of better and fairer quality living environments” (González & Healey, 2005, p. 2056). Institutional capacity is formed in urban development practices, collaborative processes, and through governance arrangements over time (De Magalhães et al., 2002; Innes & Booher, 2002) and helps to understand whether these are effective in “transforming places in more inclusive and sustainable ways” (De Magalhães et al., 2002, p. 52). Understanding institutional capacity can explain the differences between different planning contexts or projects (De Magalhães et al., 2002; Healey, 1998).

The concept of institutional capacity building is applied in urban planning and fields such as international development, social innovation, and public health (Nautiyal, 2024; Wolfram, 2016). Even within the urban context, multiple conceptualisations of capacity building⁸ are used, highlighting the importance of collective action in enabling systemic or societal change and the interdependent relationship between agency and structure (Wolfram, 2016). These conceptualisations differ in how they understand the availability or accessibility of resources, the role of power – either equated with empowerment or linked to resource access – and physical obduracy, the resistance to change resulting from the longevity of infrastructures, buildings, ecosystems, and technologies (Wolfram, 2016).

In this thesis, Healey’s institutional capacity building framework is used because it highlights public policy as a key driver of urban planning and development (Healey, 1998) and emphasises the capacities of diverse actors to mobilise and coordinate for collective purposes (De Magalhães et al.,

8 In addition to Healey’s framework, several other capacity building concepts are used in the urban context, such as urban capacity building through multilevel governance (Pierre, 2019), urban transformative capacity development (Borrás et al., 2024; Castán Broto et al., 2019; Horlings et al., 2020; Wolfram, 2016), and social innovation capacity at the community level (Wolfram, 2016).

2002). It provides a lens to examine how capacity can be developed to broaden actor participation and influence the economic, social, and environmental outcomes of urban development. Beyond formal institutions and technical expertise, the framework draws attention to local governance cultures, social and economic interconnectedness, and the strength of relationships among actors. This focus on networks linking government, the private sector, and civil society aligns closely with the aim of this thesis (De Magalhães et al., 2002). While Healey's framework does not explicitly address physical obduracy (Wolfram, 2016), its emphasis on actor networks, collaboration, and empowerment makes it possible to consider obduracy indirectly through the actors' capacity to navigate and adapt to existing system constraints. In this way, Healey's framework offers a practical and theoretically grounded approach to studying how urban actors collectively build capacity to achieve sustainable and locally relevant change (De Magalhães et al., 2002).

Inspired by Giddens' (1984) structuration theory, Healey's institutional capacity framework links structuring forces and active agency, positioning social relations within the broader context of institutional dynamics and specific times and places (Healey et al., 2002b). Drawing on Innes & Booher's (1999) discussion on consensus-building processes, Healey et al. (2002) analytically distinguish three forms of capital that shape governance: intellectual capital (knowledge resources), social capital (trust and social understanding), and political capital (the capacity to act collectively). Building institutional capacity in urban governance involves transforming, creating, and mobilising these three forms of institutional capital. In line with this, Healey's institutional capacity building framework consists of three elements, emphasising their role as fundamental elements of social interaction (De Magalhães et al., 2002): knowledge resources, relational resources, and mobilisation capacity, see Figure 1.

Healey's framework acknowledges the dynamic nature of governance networks, where actors join and leave, interaction patterns evolve, and governance structures adapt over time to guide these interactions (van Popering-Verkerk et al., 2022). It captures the entire policy process, from identifying societal needs to developing strategies and policies, followed by implementing and monitoring results (Wolfram, 2016). Collaborative approaches to urban planning and development influence all three dimensions by encouraging different ways of thinking and acting, facilitating discussions on the qualities of places, and addressing conflicts through constructive dialogue (Healey, 1998). These approaches create arenas which

can act as learning environments in which actors learn new ways of relating to each other (Healey, 1998). A governance system with strong capacity is thus characterised by its ability to learn, experiment, and adapt creatively to emerging threats and opportunities, while fostering collaboration, inclusive decision-making, and locally informed policies (Innes & Booher, 2003; Healey, 2006b). Innovation in consensus-building is central, often requiring power negotiation to enable more adaptive planning practices (Healey, 2006b).

The institutional capacity framework focuses on process dynamics over time and a relational understanding of institutional capacity (De Magalhães et al., 2002; Healey, 1998; Healey et al., 2002b, 2003), making it well-suited for analysing the institutional conditions, including goals, knowledge, perspectives, ways of working, integration, and enabling structures, that facilitate or hinder coherent and collaborative planning. Analysing institutional capacity involves examining each dimension and understanding how they function together to “address collective concerns about spatial co-existence, spatial organisation, and the qualities of places” (Healey, 2006b, p. 69). Assessing institutional capacity in planning involves understanding “how people changed their ways of doing things and seeing things” within a new frame of reference (Healey, 2006b, p. 69). Outcomes are difficult to predict because they emerge through collective learning and creative responses to changing contexts. Governance should, however, produce tangible results while fostering relationships that build trust, understanding, and support among actors, aligning policies with local opportunities and values, and ensuring capacity to endure over time (Healey, 2006b).

The following sections discuss the three elements in further detail based on the core framework and its dimensions provided by De Magalhães et al. (2002). To deepen the understanding of the three dimensions, the discussion and analysis of the dimensions draw on more recent studies that argued in line with it (Albrechts, 2010; Čolić et al., 2022; Norell Bergendahl, 2016; Polk, 2011).

Knowledge resources

Knowledge resources refer to the availability, development, and integration of various types of knowledge - formal, informal, and tacit - needed to guide and influence urban development processes (De Magalhães et al., 2002; Norell Bergendahl, 2016; Polk, 2011). Drawing on a social constructivist perspective, knowledge is seen as dynamic and socially produced, evolving

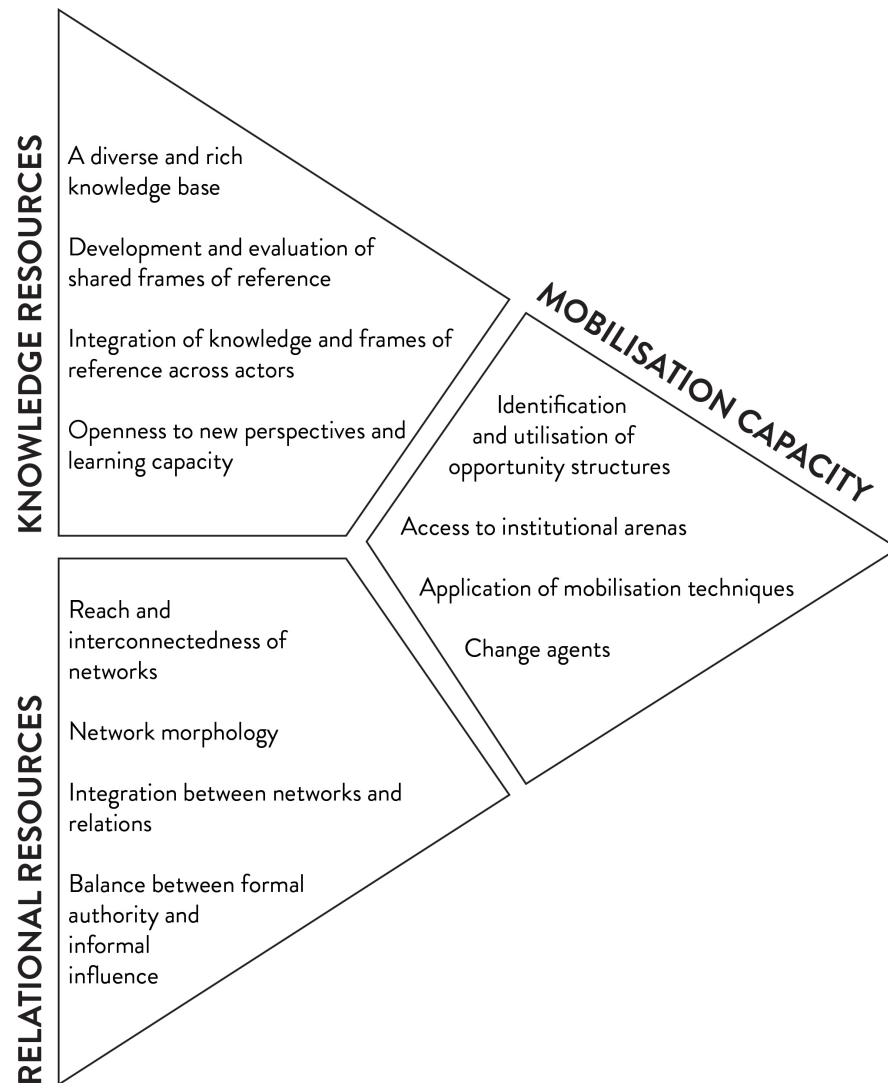


Figure 1

Framework of institutional capacity building, based on Healey (1998) and De Magalhães et al. (2002).

through interaction, reinterpretation, and co-production among actors (Čolić et al., 2022; De Magalhães et al., 2002). Knowledge resources include fixed, formalised knowledge and how tacit knowledge and experiential understanding are actively created and applied through interaction, operating across various levels (De Magalhães et al., 2002). De Magalhães et al. (2002) highlight four dimensions of knowledge resources that are important for the institutional capacity of a planning context. These are: a diverse and rich knowledge base, the development and evaluation of shared frames of reference, integration of knowledge and frames of reference across different actors, and openness to new perspectives and learning capacity (De Magalhães et al., 2002).

A diverse and rich knowledge base refers to the availability and use of various knowledge about what needs to be done, why, and how. Developing and evaluating shared frames of reference involves regular evaluation and development of the reference frameworks that shape what is considered meaningful, how interpretations are made, and how problems and issues are understood within a specific planning context. These frameworks influence how actors interpret information and give meaning to it. According to Albrechts (2010), frames of reference provide orientation by giving direction and justifying specific actions. They involve developing new ideas and processes that create shared understandings, support agreements, and enable actors to organise and mobilise influence across different arenas (Albrechts, 2010). In planning, both in the short and long term, frames of reference guide results and implementation by shaping how decisions, actions, and projects are defined, while also incorporating processes of monitoring, evaluation, feedback, adjustment, and revision (Albrechts, 2010).

For institutional capacity to be built, the knowledge base and frames of reference should be integrated as much as possible among actors. This requires intensive and successful efforts to translate different actors' knowledge and frames of reference for each other, as mutual learning and knowledge exchange depend on explicit expression of underlying histories and perspectives. Shared understanding and similar values are necessary for achieving consensus, and processes involving multiple actors that lead to consensus also foster learning and create shared experiences and references. Institutional capacity is strengthened when actors are open to and capable of incorporating new ideas that can be used to develop understanding, action, and access to new information and inspiration. This includes continuously updating and adapting knowledge and tools used in planning to align with established goals (De Magalhães et al., 2002). Frames of reference need to be collectively built, rooted in context, and flexible enough to adapt to uncertainty while still providing a clear sense of direction and commitment to action (Albrechts, 2010). In sustainable urban development, Polk (2011) similarly emphasises that knowledge resources must recognise the multi-level complexity of sustainability challenges, include critical reflection on existing frames, and support openness to alternative framings and solutions.

Relational resources

Relational resources refer to the network structure, reach, quality, and relationships among actors involved in planning processes (De Magalhães et al., 2002). Relational resources reflect the social capital within and across

actor groups and significantly influence the potential for collaboration, trust-building, and knowledge sharing (De Magalhães et al., 2002; Norell Bergendahl, 2016; Polk, 2011). These resources are developed through collaborative efforts and are built on mutual respect, trust, shared understanding, and the formation of networks and alliances among participants (Čolić et al., 2022). According to De Magalhães et al. (2002), the four dimensions of relational resources are the reach and interconnectedness of networks, network morphology, integration between networks and relations, and the balance between formal authority and informal influence within planning networks. The reach and interconnectedness of networks include networks that link actors affected by or have an interest in a particular issue. A network's morphology is about the structures that define the connections between actors and networks. This also means that relationships should be durable over time and space and facilitate network exchange. Integration between networks and relations is characterised by actors participating in multiple networks, values that link actors together, and contexts where exchange between different networks can occur. The balance between formal authority and informal influence within planning networks includes how decision-making power is distributed among actors. It is also determined by the connection between a specific network and the associations where formal power exists, whether financial, regulatory, or ideological. This perspective on power primarily covers formal decision-making authority and mandates to make decisions. Adequate relational capacity, therefore, requires not only dense and inclusive networks but also high-quality relationships that promote trust and enable cooperation across institutional and sectoral boundaries (De Magalhães et al., 2002). In sustainable urban development, Polk (2011) emphasises that strong relational resources are reflected in networks characterised by trust, reciprocity, and openness, where actors from relevant sectors and governance levels are actively engaged. Importantly, these networks should foster new constellations of actors that bridge organisational divides and governance scales, enabling more integrated and adaptive planning.

Mobilisation capacity

Mobilisation capacity refers to the ability of actors and their networks to activate and coordinate knowledge and relational resources to initiate, sustain, and steer collective action toward shared goals (De Magalhães et al., 2002). It represents the dynamic interface between structure and agency, highlighting both the institutional conditions that shape opportunities for action and the ability of individuals to read these conditions, build trust, foster learning, and generate momentum for change (Čolić et al., 2022; Norell Bergendahl,

2016). Mobilisation capacity builds upon and transforms knowledge and relational resources into strategic action. Effective mobilisation depends on four interrelated factors (De Magalhães et al., 2002). First, actors must identify, utilise, and develop opportunity structures. It involves recognising and aligning with broader structural changes that open up possibilities for transformation and shaping agendas that attract and mobilise support for collective action. Second, mobilisation requires accessing key institutional arenas where regulatory powers and decision-making capacity are concentrated and where change can occur. These arenas serve as contexts where issues are framed, strategies are developed, and different actors can meet to discuss and exchange ideas. Third, the ability to apply mobilisation strategies and techniques, such as leveraging power, funding and regulation. Finally, qualified and empowered change agents, individuals or organisations capable of steering processes, supplying resources, and challenging existing norms, are important to sustaining mobilisation over time (De Magalhães et al., 2002). As Polk (2011) points out, mobilisation capacity can be assessed by examining whether new ways of working in local and regional policymaking have emerged that better support sustainable urban development, and whether these have led to concrete impacts on formal planning and governance. Mobilisation capacity captures the capacity of actors to move from potential to action, by mobilising ideas, networks, and resources into concrete steps that shape planning outcomes (De Magalhães et al., 2002; Norell Bergendahl, 2016; Polk, 2011).

3.3 The middle-out perspective

This thesis uses the middle-out perspective as a complementary analytical lens. Originating primarily in energy studies, the framework introduced middle actors as enablers of societal transitions, situated between actors at the top and the bottom (Janda & Parag, 2013; Parag & Janda, 2014). The middle-out perspective is an additional way to deliver change, alongside top-down and bottom-up efforts. Positioned between top-down authorities and bottom-up initiatives, middle actors can operate as change agents, a role included in the mobilisation dimension of institutional capacity building. The middle-out perspective also aligns with a relational understanding of planning by emphasising the interplay between structure and agency and highlighting how interactions among actors shape collective action (Healey & Barrett, 1990).

The distinction between top, middle, and bottom actors is not fixed, as categories vary depending on the context, situation, and an actor's position relative to others (Parag & Janda, 2014). For example, local governments could be regarded as a top actor in one context but as a middle actor in another. Middle actors may be individuals, organisations, or networks with sufficient connectivity and knowledge to mediate between levels (Parag & Janda, 2014). This positional advantage enables them to translate the interests and contexts of bottom actors to top actors and vice versa, while engaging with other middle actors through formal or informal networks (Eriksson & Olsson, 2022). Top actors could include policymakers and decision-makers at different governance levels, such as national governments shaping laws and funding priorities or local governments designing planning regulations and local programmes. Bottom actors could include citizens, tenants, and community groups whose grassroots activities and everyday practices may influence change from the bottom up (Zohar et al., 2021).

Janda & Parag (2013) describe three key modes through which middle actors can influence other actors: enabling, mediating, and aggregating. Through their middle position, they can facilitate technology adoption, mediate policy goals, bundle technical opportunities, and play a decisive role in planning and design processes by determining which energy measures are implemented (Parag et al., 2017; Parag & Janda, 2014; Reindl, 2020). Their role is often implicitly assumed to align with public-interest objectives such as climate change mitigation (Janda et al., 2019). Yet, middle actors may also pursue agendas that diverge from these collective goals, highlighting the importance of examining their motivations and interests (Parag & Janda, 2010).

As conceptualised by Janda & Parag (2013), middle actors differ from intermediaries because they possess greater agency and capacity to enact change. Intermediaries are often brokers with short-term or facilitative roles, whereas middle actors are embedded, pre-existing actors who actively shape dynamics through their own initiatives, priorities, and influence (Parag & Janda, 2014; Zohar et al., 2021). Rather than serving merely as conduits, they are empowered participants who shape decisions and actions (Cauvain & Karvonen, 2018; Owen et al., 2020). Middle actors can identify windows of opportunity, experiment with new approaches, and influence policy. This perspective aligns with understanding institutional capacity as a dynamic process of shaping and steering change within institutional settings, rather than a fixed condition. The middle-out perspective adds analytical depth

to institutional capacity building by foregrounding the roles and strategies of middle actors. It helps explain how capacity is enacted and mobilised in practice, particularly in urban development contexts where power and knowledge are distributed.

The middle-out perspective emphasises that the ability of middle actors to implement change depends on their levels of agency and capacity (Zohar et al., 2021). These concepts draw on sociological and psychological theories of behaviour, including structure, internal and external motivations, and organisation studies focusing on organisational concern and conditions (Parag et al., 2017). Agency refers to an actor's willingness, motivation, and intent to take action (Murtagh & Sergeeva, 2021; Parag & Janda, 2014) and is shaped by social norms, culture, regulations, and dominant practices (Zohar et al., 2021). Capacity is an actor's practical ability to act on intentions or decisions (Parag & Janda, 2014; Reindl, 2020; Zohar et al., 2021). Both agency and capacity are influenced by a wide range of technical, institutional, financial, political, social, and psychological factors (Janda & Parag, 2013; Parag et al., 2017; Parag & Janda, 2014), which can be external, such as infrastructure, regulations, and technology, or internal, including financial resources, knowledge, and expertise (Zohar et al., 2021). Understanding these dynamics is needed for identifying how middle actors can be empowered to drive change (Parag & Janda, 2014), providing a concrete operationalisation of mobilisation capacity within the broader institutional capacity framework. The middle-out perspective allows for a more nuanced understanding of urban development processes by examining how actors internalise and navigate external pressures and institutional structures, and how they use strategy and relationship-building in specific projects to effect change (Healey & Barrett, 1990).

CHAPTER 4

Research design

This chapter presents the research design and methodology underpinning this thesis. I begin by reflecting on the research process, before outlining the methodological approach in Section 4.2. I then describe the three case studies, detailing the data collection strategies and analytical approaches used. The chapter concludes with a discussion of the ethical considerations that guided the research.

4.1 Reflection on the research process

The reflection on the research process behind this thesis is inspired by Healey's (2015) introduction chapter, "Personal reflections on research careers" in the *Routledge Handbook of Planning Research Methods* (p. 3):

Doing good research is not just a question of following appropriate technical procedures. It takes complex judgements, imaginative insight and intense critical exploration of the topic in hand. Research requires professional skill, just as doing good planning work does. And as with the development of planning skills, it takes education, experience and time to mature.

My interest in planning research began during my bachelor's and master's in Architecture, Urbanism, and Building Sciences at Delft University of Technology (the Netherlands). During my studies, I developed a strong foundation in urban design and planning, with a particular interest in sustainability concepts on the neighbourhood scale. My bachelor's included a semester at the Department of Human Geography at Utrecht University (the Netherlands), where I learned qualitative research methods in more detail. During my master's, I spent a semester at Chalmers University of Technology (Sweden), learning another national planning context. I finished

my master's in Urbanism with a project about zero-waste neighbourhoods and focused on a case study in Amsterdam. After graduating, I worked as a researcher at Delft University of Technology for a year on a project on the circular economy in six different European cities. Following that, I spent nearly three years as a sustainability consultant at Sweco in Rotterdam (the Netherlands), working on various sustainable urban development and research-by-design projects, which provided experience in planning at multiple scales and from diverse perspectives.

In November 2020, I began my PhD at the Department of Architecture and Civil Engineering at Chalmers University of Technology as part of the interdisciplinary research project Socio-technical ecology: Energy systems in urban areas with a high sustainability profile (SOTEK). The project, within the Graduate School in Energy Systems (*Forskarskola Energisystem*), was a collaboration between Lund University, Linköping University, and Chalmers University of Technology. The project aimed to explore urban development and sustainable energy systems, examining how they could be implemented at the district, building, and household levels. As part of the project, I collaborated with senior researchers and two other PhD students at Linköping University and Lund University.

Although writing a compilation thesis has strengthened my PhD research through multiple rounds of feedback and revisions on the four papers, it has also brought some challenges. When I began my PhD five years ago, my knowledge of the Swedish urban planning and development context was limited. I spent the first few months conducting background research on the Swedish planning system to address this. My early progress was also influenced by the COVID-19 pandemic, which limited travel within Sweden throughout 2020 and 2021. As a result, I began the empirical study for Paper 2 by focusing on the urban development project of Kvillebäcken in Gothenburg, where I was living and working from home. Site visits provided an initial understanding of the project, and while the first interviews were conducted in person, subsequent ones had to be moved online due to evolving restrictions. This exploratory case study of implementing MEPR at the building scale offered a clearly defined starting point for my empirical research. In parallel, I began work on Paper 1 in collaboration with colleagues as part of one of the deliverables for the interdisciplinary SOTEK research project. Paper 1 is based on a semi-systematic literature review of research on energy systems in sustainable urban development projects in Sweden. The review highlighted governance arrangements involved in such projects and

sparked my interest in examining the roles and responsibilities of actors in planning processes in more detail in Paper 2. It identified potential directions for further research, including the sociotechnical ecology framework and the arena perspective, but these proved difficult to operationalise in my empirical cases. Still, Paper 1 provided important insights that shaped the design and scope of the subsequent studies.

Over the course of the PhD research, the focus of the empirical research gradually expanded from a narrow concern with building-level energy performance to a broader examination of how sustainability goals are integrated into urban planning processes. From mid-2021 onwards, multiple visits to the urban development projects of Vallastaden (Linköping) and Brunnshög (Lund), together with six reference group meetings involving key actors from all three projects, provided important contextual insights and supported the interpretation of the data (MacCallum et al., 2019). During a PhD course at NTNU in Trondheim (Norway) in 2022, I met Tonje Trulsrud Healey-Brudal and we discovered a shared interest in understanding how ambitious energy goals are implemented in practice. This led to a collaborative comparative study of four urban development projects in Norway and Sweden, resulting in Paper 3. The study highlighted the increasing role of land allocation processes in the Swedish cases, which enabled local governments to negotiate stricter energy requirements but also revealed gaps in follow-up and citizen involvement. These findings deepened my understanding of the governance challenges surrounding the implementation of energy policies in urban development projects. Building on the insights from Papers 1–3, Paper 4 examined how land allocation processes functioned as experimental arenas for implementing sustainable urban development.

A challenge in compiling this thesis was aligning the vocabulary and concepts used across the different papers. The terminology varied not only to align with the scope and requirements of each journal but also because the research focus and analytical frameworks evolve as new insights emerge. Some terms were adjusted and harmonised to create a coherent storyline for the thesis. For example, what Paper 2 referred to as MEPR is discussed more broadly in the thesis as *energy policies*, capturing the broader set of planning instruments shaping energy systems in sustainable urban development. Similarly, descriptions of sustainable urban development projects, governance arrangements, and planning instruments differ across

Table 3

Concepts used in the thesis and across the papers.

Concept used in the thesis	Paper 1	Paper 2	Paper 3	Paper 4
Sustainable urban development project	Sustainability-profiled district	Sustainable urban development project	Urban development project with a PED ambition or a similar goal	Sustainable urban development project
Local government	Municipality	Local government	Municipality	Local government
Energy policies	Energy goals and requirements	MEPR	Energy performance requirements	Part of the project-specific visions and goals and sustainability requirements
Governance arrangement	Combinations of policy instruments	-	Stakeholder collaboration	Governance arrangement
Planning instrument	Policy instrument	Policy instrument	Planning instrument, instrument and tool	Planning instrument or instrument

the papers. Table 3 provides an overview of the main concepts used in each paper and how they were harmonised for the thesis.

Beyond terminology, the interdisciplinary positioning of this thesis, situated primarily within urban planning but with a strong emphasis on energy policies and urban development, places it at the intersection of multiple disciplines. This interdisciplinary character has enriched the research but also posed challenges in defining clear academic boundaries. At the same time, it reflects the reality of sustainable urban development projects, where planning, energy (among other sustainability themes), and governance intersect.

Table 4 summarises the research aim, empirical material, methodological approach, and analytical focus of each paper. In the remainder of the chapter, I elaborate on the methodological approach, the case studies and data collection methods, the analytical approaches, and ethical considerations.

Table 4

Overview of the four papers included in this thesis.

Paper	Title	Research aim	Data	Methodological approach	Analytical focus
1	Energy systems in sustainability-profiled districts in Sweden: A literature review and a socio-technical ecology approach for future research	To provide an overview of previous research on the planning, development, and evaluation of energy systems in Swedish sustainable urban development projects	70 journal and conference articles published between 2003 and 2021	Semi-systematic literature review	Thematic analysis of the literature to identify key themes and socio-technical ecology as a framework to discuss the results
2	Implementing minimum energy performance requirements ‘from the middle’: shifting levels of agency and capacity of housing developers in Sweden	To examine MEPR implementation across the development and use phases by exploring the shifting agency and capacity of seven housing developers over time	Energy data; two rounds of interviews (2012, 2021/2022) with developers; planning documents.	Longitudinal case study	Analysis of developers’ agency and capacity in implementing MEPR through the middle-out perspective
3	Towards a positive energy balance: A comparative analysis of the planning and design of four positive energy districts and neighbourhoods in Norway and Sweden	To examine the implementation of energy measures in the planning and design of four PED projects, comparing Norwegian and Swedish institutional contexts	Planning documents; semi-structured interviews (local governments, developers, energy company); energy data.	Comparative case study	Analysis of planning and design processes across four analytical levels: framework conditions, stakeholders, processes, and outcomes
4	Building institutional capacity through experimentation in sustainable urban development projects in Sweden	To examine whether and how experimentation in land allocation processes strengthens the institutional capacity to implement sustainable urban development projects	Semi-structured interviews (local government, developers); planning documents.	Multi-sited case study	Thematic analysis using institutional capacity building as a framework

4.2 Methodological approach

This thesis is grounded in a social constructivist perspective, viewing urban planning not as a neutral or technocratic process, but as a socially embedded activity shaped through collective meaning-making. Planning is thus conceptualised as a dynamic social process in which “ways of thinkings, ways of valuing and ways of acting are actively constructed by participants” (Healey, 2006b, p. 29). Adopting an interpretive research approach, I focus on the understandings and experiences of actors, implying that insight must be grounded in the experiences of those working in urban development projects (Bell et al., 2019). As Krueger et al. (2019) note, this perspective requires us to investigate how people create reality, which evolves over time.

The research design for this thesis is case study research, which is widely used in urban planning to examine planning practices and policy implementation (Bracken, 2014; MacCallum et al., 2019; Sarvimäki, 2017). Case study research involves an in-depth investigation of one or more cases, understood as examples of a phenomenon (Tight, 2024). Cases are typically complex and clearly bounded, studied within their real-world context, and analysed holistically, considering multiple dimensions and interconnections (Tight, 2024). Context-dependent knowledge and situated understanding are central to case study research (Flyvbjerg, 2006; Groat & Wang, 2013; Tight, 2024).

The aim of this thesis is to examine how institutional capacity for sustainable urban development projects is built over time through experimentation in urban planning, focusing on the implementation and follow-up of energy policies. Capturing this longitudinal understanding can be challenging due to the long timeframes, shifting contexts, and dynamic interactions inherent in urban development projects (Lindkvist et al., 2019). In this thesis, the longitudinal understanding refers to tracing how sustainability ambitions, governance arrangements, and actor interactions evolve across different project phases. Using multiple cases strengthens this longitudinal perspective by enabling the comparison of processes at different stages of development, revealing patterns, differences, and shared dynamics that unfold over time. Multiple case study designs allow for an in-depth analysis of each case and cross-case comparison to identify patterns, differences, and common mechanisms across multiple settings (Krehl & Weck, 2020; Sarvimäki, 2017). By linking planning ambitions to implementation, Papers 2, 3, and 4 collectively provide a longitudinal understanding of how

sustainability goals are translated into practice and how actors develop the institutional capacity required to navigate complex, multi-actor, and multi-level governance processes. In this way, the research captures the immediate outcomes of planning and policy interventions and the evolving processes through which institutional capacity building takes place across the lifecycle of urban development projects.

The research follows a dialogical theory–research relations model, which understands theory development as an iterative interaction process (Rule & John, 2015). This approach is particularly suitable for multiple case study research, allowing for the application, testing, and refinement of theory throughout the research process by analysing multiple cases, focusing on how a phenomenon exists across several cases (Ridder, 2017; Rule & John, 2015). Research questions provided a guiding structure rather than a strict hypothesis (Krehl & Weck, 2020). This dialogical model is reflected in the development of my PhD research. The literature review in Paper 1 helped clarify the research focus and theoretical landscape. Paper 2, which examined the implementation of MEPR by developers, was guided by the middle-out perspective as a conceptual lens, building on similar applications of this framework in similar studies (Eriksson & Olsson, 2022; Simpson et al., 2020; Zohar et al., 2021). The analysis of this first case shifted my focus from a narrowly defined evaluation of energy performance to a broader interest in governance, planning theory, and institutional capacity building. This evolution of focus and theoretical framing reflects the co-development of theory and research across the different stages of the PhD research (Rule & John, 2015).

The trustworthiness and credibility of the case study research is addressed through triangulation of multiple data sources, including semi-structured interviews, planning documents, and energy data. Case study research in urban planning often relies on diverse empirical materials (Bracken, 2014; Eisenhardt & Graebner, 2007). Triangulation allowed for cross-verification and richer insights (Eisenhardt, 1989; Patton, 2015): planning documents were used to guide interview design and validate participant claims, while energy data was analysed alongside interview material and used as a basis for discussion, revealing how actors interpreted and responded to project outcomes. Dependability was supported by a transparent description of the data collection and analysis process, including the coding approaches and analytical frameworks. Finally, it is also important to consider the role of the researcher. All research inevitably carries bias from the researcher. Therefore,

researchers need to be reflexive (Gabriel, 2017). Throughout the research process, I made a conscious effort to remain aware of my background, motives, values, and interests, reflecting on how these factors influenced the research and my interpretation of the empirical material. This reflexive stance was further enhanced through discussions with co-authors, supervisors, and colleagues, which often focused on potential interpretations of the material (Patton, 2015). Feedback received from reference group meetings, seminars, and conferences also played an important role in refining the analytical focus and theoretical positioning.



Figure 2
Locations of the municipalities where the three sustainable urban development projects are situated: Gothenburg (Kvillebäcken), Linköping (Vallastaden), and Lund (Brunnshög).

4.3 Three sustainable urban development projects as empirical cases

Case study research requires clarifying what each case represents and its purpose within the broader scope of the study (Krehl & Weck, 2020; Sarvimäki, 2017); in other words, what are these cases a case of? Case selection is typically driven by expectations regarding information content and its potential to explain broader issues (Flyvbjerg, 2006). This thesis examines three sustainable urban development projects in Sweden: Kvillebäcken (Gothenburg), Vallastaden (Linköping), and Brunnshög (Lund) (see Table 5). These projects are considered *critical cases*, falling into Flyvbjerg's (2006) most likely category⁹, as they are strategically important for understanding the general issue of how sustainability ambitions are implemented in urban development projects. As Flyvbjerg (2006) notes, critical cases are those most likely to either clearly support or challenge propositions and hypotheses, making them especially valuable for in-depth analysis. The three cases are expected to provide rich empirical insight into how energy policies are integrated into urban development processes, how these policies interact with broader planning, governance, and institutional arrangements, and thereby support the aim of the thesis to examine how institutional capacity for sustainable urban development projects is built over time. Case identification was guided primarily by three criteria: the urban planning context, the projects' status as testbeds or flagship initiatives for sustainable urban development and the explicit implementation of energy policies and innovations, each discussed in detail below.

Urban planning context

All three projects are located in relatively large municipalities in southern Sweden - Gothenburg, Lund, and Linköping - which have the organisational capability and previous experience to undertake large-scale urban development projects with sustainability ambitions (see Figure 2). A common feature across the urban development projects is significant municipal land ownership, which plays an increasingly important role in shaping the planning process and the governance arrangements (Brokking et al., 2020).

9 Flyvbjerg (2006) distinguishes between four types of cases: (1) deviant/extreme cases, used to study unusual cases that are either exceptionally problematic or exceptionally successful, (2) maximum variation cases, aimed at understanding how different circumstances influence case processes and outcomes, (3) critical cases, selected for their strategic importance in relation to a broader problem, allowing for logical deductions, and (4) paradigmatic cases, used to develop metaphors or establish frameworks for a given domain.

Table 5

Overview of key characteristics for the three case studies.

	Kvillebäcken (Gothenburg)	Vallastaden (Linköping)	Brunnshög (Lund)
Type	Brownfield, new-built development	Greenfield, new-built development	Greenfield, new-built development
Size/area	11.5 ha	20 ha	225 ha
Duration	2002 - 2019	2011 - 2030	2006 - 2055
Land ownership	Local government and three developers	Local government	Local government, a small number of developers, the Church of Sweden, and Science Village Scandinavia
Main functions	Housing and commercial properties	Housing, commercial properties, schools, and a care home	Housing, offices, research facilities, commercial properties, schools, and services

Testbeds or flagship projects for sustainable urban development

Each of the three cases is branded as a testbed or flagship initiative, serving as a platform for innovative solutions and planning practices. These projects are framed in local planning agendas as arenas for experimentation, allowing local governments to test new forms of governance, collaboration, and technical innovations for sustainable urban development. While sustainability branding is now widespread in Swedish urban development projects (Candel, 2022), these cases stand out due to the explicit ambition to serve as models for innovation and learning.

Implementation of energy policies and energy innovations

Energy policy implementation and innovation are common features across the three cases. In each project, project-specific energy-related goals are embedded in the urban development processes. In Kvillebäcken, developers were contractually required to meet a MEPR exceeding Swedish building regulations, and various energy-related innovations were tested. In Vallastaden, high energy efficiency ambitions were part of the land allocation processes, with an underground utility tunnel as one of the main innovations. Brunnshög has similar energy requirements in its land allocation processes and aims to establish a PED, emphasising local electricity generation and a low-temperature district heating network.

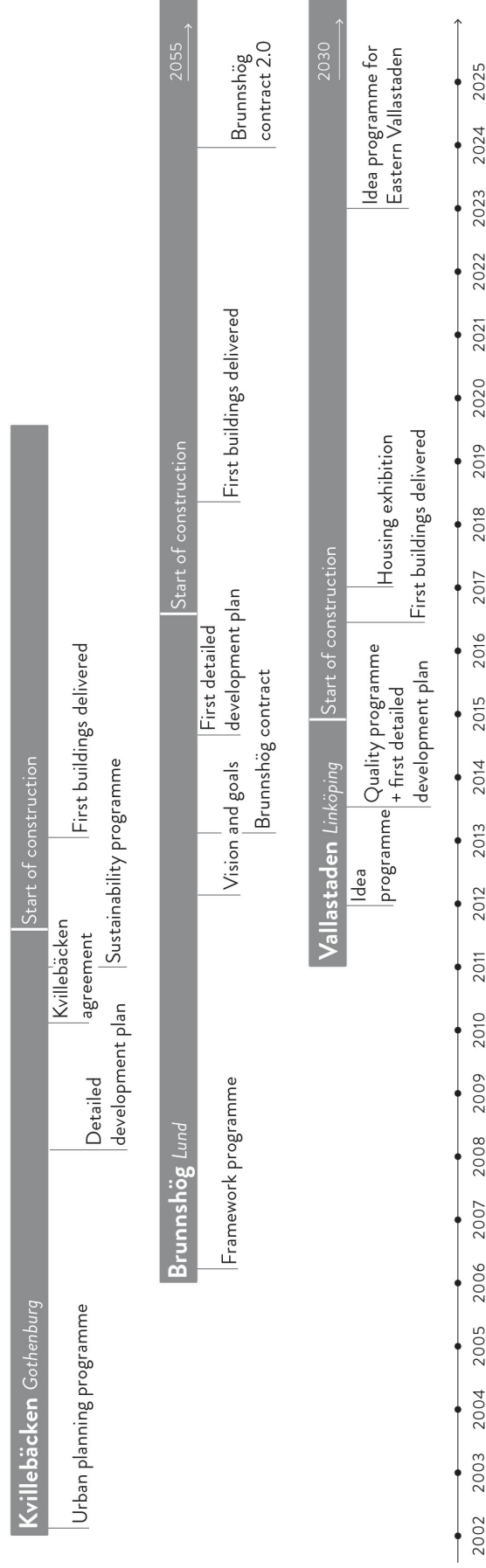


Figure 3 Timeline showing the planning processes of the three case studies with the main planning documents.

Beyond the justifications outlined above, several practical considerations also influenced case selection. At the start of this PhD research in 2020, relatively little empirical research had been published on Kvillebäcken, Vallastaden, and Brunnshög, in contrast to more extensively analysed projects such as Stockholm Royal Seaport (Stockholm) or Western Harbour (Malmö). This provided an opportunity to contribute new insights to the field, addressing existing research gaps in energy systems and sustainable urban development studies in Sweden. Another factor was the issue of interview access and participant fatigue. Recruiting participants for interviews can be challenging in cases that have already been extensively studied. Selecting less-studied projects reduced the risk of interview fatigue among actors. Given the long timeframes of urban development projects (Lindkvist et al., 2019), selecting cases at different stages of completion was also a strategic choice to enable a longitudinal understanding of how sustainability ambitions, governance arrangements, and actor interactions evolve. At the start of this PhD project in 2020, Kvillebäcken had just been completed, Vallastaden was in an intermediate phase, and Brunnshög was in its early stages of construction (see Figure 3). This diversity in project timelines provided a richer perspective on the development processes, allowing the study to capture insights from different phases and understand institutional capacity building in planning practices across extended periods.

Additionally, the case selection benefited from prior research experience and networks established by supervisors and senior researchers within the SOTEK project. Their familiarity with these projects, previous collection of empirical material, and established relationships with key actors provided valuable resources that helped me in empirical material collection and analysis. As Krehl & Weck (2020) note, close access to key sources and participants is often essential to enhance the depth and quality of data collection. The selection of cases thus also reflects pragmatic concerns central to qualitative research: feasibility, access, and the ability to generate detailed, context-sensitive data.

While this thesis focuses on three Swedish cases, Paper 3 includes a comparative analysis involving two Norwegian cases, the sustainable urban development projects of Ydalir (Elverum) and Verksbyen (Fredrikstad), examined in collaboration with Tonje Trulsrud Healey-Brudal, who was responsible for the analysis of the Norwegian cases. As a result, the Norwegian cases are not explored further in this thesis. However, the international relevance and broader implications of the Swedish cases are



Figure 4

Left: Aerial view of Kvillebäcken. Right: Buildings from above in Kvillebäcken.

discussed in Chapter 7. A more detailed presentation of each of the three cases follows below.

Kvillebäcken (Gothenburg)

Kvillebäcken is an urban development project in Gothenburg, Sweden's second largest city, which consists of a brownfield area of 11.5 hectares. Between 2002 and 2019, around 2000 apartments and 24.000 m² of commercial spaces were developed. The project was branded as a showcase for sustainable urban development (Brorström, 2015; Hagbert & Femenias, 2015; Thörn & Holgersson, 2016). Seven developers and the municipal development company (*Älvstranden Utveckling*) formed a consortium to develop the 24 plots in Kvillebäcken. Three different types of developers were present in Kvillebäcken: developers who build to own, developers who build to sell, and developers who both build to own and sell. Three plots have a commercial function and 21 plots have a mainly residential function.

The project aimed to foster collaboration, common goals, and shared responsibility within the consortium. Central to the urban development process was the Kvillebäcken agreement and a sustainability programme that included ambitious goals for sustainable urban development, including



Figure 5

Left: Aerial view of Vallastaden. Right: Buildings in Vallastaden.

stricter MEPR for the buildings. This programme aligned with the local Programme for Sustainable Construction in Gothenburg (2009) and incorporated the *Miljöbyggnad* certification, setting level Silver for most aspects, while energy performance was required to meet level Gold: delivered energy at 60 kWh/m² per year, which was significantly stricter than the Swedish building code by that time (90 kWh/m² per year). The consortium secured SEK 35 million in funding from the Delegation for Sustainable Cities programme to support six sustainability innovations, including energy-smart buildings, bicycle storage units, and energy-efficient waste trucks (Brorström, 2015).

Vallastaden (Linköping)

Vallastaden is an urban development project in Linköping (Sweden). Planning for this new district on an area of 20 hectares started in 2011 (Palm & Wihlborg, 2013). In 2012, the local government organised an urban design competition to create a plan for the next Swedish urban planning and housing exhibition to showcase innovative urban planning ideas. The main question of the Vallastaden competition was “What does sustainable urban planning look like in the future?”. The winning urban design proposal came from OKIDOKI architects. The first phase of Vallastaden, consisting

of around 1000 dwellings, was presented at the *Vallastaden 2017* exhibition. A separate company was established to coordinate the area's development for the housing exhibition. The company was decommissioned in 2018, after which the local government of Linköping took over the responsibility for the planning and development (Glad & Gramfält, 2019).

The urban planning and housing exhibition served as a platform to test innovative ideas, including new infrastructure solutions like an underground utility tunnel. This 1.8 km tunnel includes cables and pipes for district heating, electricity, telecommunications, water, waste, and sewage systems. Vallastaden was designed to be a model of sustainable urban development, aiming to use energy and resources efficiently and contribute to Linköping's goal of becoming CO₂-neutral by 2025. A key aspect of the development process was its land allocation processes. Instead of selling land to the highest bidder, the local government set a fixed price, and developers had to compete based on different criteria, including sustainability criteria. As a result, around 40 different developers were involved in the first phase, creating a diverse mix of buildings (Glad & Gramfält, 2019). The later phases used different methods for land allocation. When fully completed, the district will have around 1800 dwellings, commercial properties, schools and a nursing home.

Brunnshög (Lund)

Brunnshög is an urban development project in Lund, Sweden, covering 225 hectares. Planning began early on in the 1990s when Lund's comprehensive plan identified the area for future development. However, the urban development process itself started in 2006. The construction of two new material science facilities, the European Spallation Source and MAX IV, a synchrotron radiation facility, were an important reason for the development of Brunnshög. Development is expected to continue until 2055. The vision for Brunnshög is to become a PED, which means it will generate more energy than it uses. An important part of achieving this goal is a low-temperature district heating system that utilises excess heat from the research facilities. In addition to these research facilities, Brunnshög will include 6000 dwellings, offices, commercial spaces, schools, and public services.

In 2020, a new tramline was ready to connect the city centre of Lund with the two research facilities, with several stops within Brunnshög. The first phase (Southern Brunnshög) is currently completed and the second phase is under development (Central Brunnshög). A separate project organisation



Figure 6

Left: Aerial view of Brunnskö. Right: Brunnskö under construction.

within the local government is responsible for developing Brunnskö and operates from a shared office in a different building from the rest of the local government (Madureira, 2014). Branded as a leading example of European sustainable urban development, Brunnskö's sustainability strategy follows three core principles: minimise, balance, and maximise. The first principle includes the energy goal: minimising the climate impact is about generating sustainable energy, reducing energy use, and climate-adapting the urban environment to face the effects of a changing climate. Land allocation competitions encourage innovative solutions in the buildings, with developers selected based on sustainability and other criteria. Most of the land in Brunnskö is owned by the local government of Lund, with additional landowners including the Lund Cathedral organisation and Science Village Scandinavia. Lund Cathedral is developing Råängen, a 12-hectare area within Brunnskö, including 1500 homes, schools, and business premises (Pelzer et al., 2021). Science Village Scandinavia is responsible for an 18-hectare site surrounding the research facilities, known as Science Village, which will include leisure functions and offices. This thesis focuses exclusively on the areas developed by the local government.

4.4 Data collection

This thesis draws on four data sources: (1) journal and conference articles gathered through a semi-systematic literature review, (2) semi-structured interviews, (3) planning documents, and (4) energy data. The four papers used different combinations of data, depending on their research focus (see Table 4). Below, the four sources of data are discussed in more detail.

Articles identified through a semi-systematic literature review

Paper 1 draws on 70 articles identified through a semi-systematic literature review, including 56 journal articles and 14 conference papers published between 2003 and 2021 (see the appended paper for details on search strings and the included papers). The review aims to map the current state of knowledge and identify specific research gaps (Sovacool et al., 2018). Semi-systematic reviews are beneficial for exploring interdisciplinary research areas and broad topics, as they can synthesise existing knowledge, outline research trends, and highlight areas for further investigation (Snyder, 2019). Given the interdisciplinary nature of research on energy systems in sustainable urban development projects, a semi-systematic literature review was chosen for Paper 1. The review followed a two-step exclusion process – (1) initial screening and (2) eligibility assessment – aligned with the PRISMA guidelines (Page et al., 2021). Rayyan software was used to facilitate the screening process.

Semi-structured interviews

In Papers 2, 3, and 4 semi-structured interviews were used to explore the perspectives of the local governments, developers and an energy company regarding the implementation and follow-up of energy policies in the sustainable urban development projects. As Döringer (2021) argues, semi-structured interviews are valuable for understanding how key actors perceive and interpret issues based on their experiences. While semi-structured interviews follow a set of predetermined themes or questions (Cassell, 2015; Silverman, 2015), they remain flexible and conversational, allowing participants' answers to shape the discussion (Silverman, 2015). Semi-structured interviews ensure consistency across interviews while maintaining adaptability to capture nuanced insights (Silverman, 2015). The interviews generated rich empirical material that provided insight into the participants' viewpoints based on their professional activities, experiences, and interpretations (Kvale, 2007). Professional actors, such as planners, project leaders, and developers, are typically skilled in articulating

Table 6

Overview of interviews per urban development project.

Kvillebäcken (Gothenburg)	Vallastaden (Linköping)	Brunnshög (Lund)
13 interviews with developers (2012), 7 interviews with developers (2021/2022)	1 interview with a developer (2025)	4 interviews with developers (2024/2025)
1 interview with the project manager of the municipal development company (2022)	6 interviews with local government representatives (2022/2024)	4 interviews with local government representatives (2023/2024)
	1 interview with a project manager at the energy company (2022)	

their work processes and reasoning, making these interviews an opportunity for reflection and knowledge sharing. Gabriel (2017) notes that qualitative research aims to develop a coherent and meaningful understanding by constructing coherent narratives that make sense of people's actions and experiences.

The interviews were conducted with key actors directly involved in the planning and implementation of the three urban development projects. On the local government side, participants included project leaders for the urban development projects, planners (*planeringsarkitekt*) and planning engineers (*planeringsingenjör*) responsible for detailed development plans, land and development engineers (*mark- och exploateringsingenjör*) managing land allocation processes, and city architects, whose responsibilities span strategic planning, urban design, and building permits. On the developer side, participants included project leaders responsible for their construction projects and energy managers, particularly in cases where developers were building to own. One interview was also conducted with the project leader at the energy company responsible for the energy system in Vallastaden.

Participants were recruited through purposive and snowball sampling (Bell et al., 2019). Initial selection focused on actors whose roles were directly relevant to the research questions, while snowball sampling allowed early participants to recommend additional suitable participants. Recruiting local government representatives was relatively straightforward due to Sweden's strong transparency norms and the principle of public access to information (*offentlighetsprincipen*). However, interviews with developers were more

challenging, as was also found by Gurung & Özogul (2022). The project-based nature of the construction industry, combined with high staff turnover, meant that individuals involved in earlier phases were often unavailable or less willing to discuss past work. In some cases, participants may have been reluctant to reflect critically on projects that did not fully meet expectations due to reputational concerns or commercial sensitivity.

The thesis includes 37 semi-structured interviews, summarised in Table 6. For Paper 2, I worked with 13 semi-structured interviews conducted in 2012 by another researcher. As I was not involved in their original data collection or transcription, I spent considerable time familiarising myself with these materials. In line with Braun & Clarke (2006), the transcripts were cross-checked against the original audio recordings to ensure accuracy and to internalise the content. Some of the remaining 24 interviews were conducted jointly with other PhD students from the SOTEK research project or with Paula Femenias.

Multiple interview guides were developed, aligning with the specific focus of the paper. These guides were structured around core themes with example questions (Kvale, 2007) but allowed flexibility to follow participants' lines of thought. For Paper 2, a longitudinal perspective was applied by combining 13 semi-structured interviews conducted in 2012 (during a previous research project) with a new round of interviews conducted in 2021–2022 with the same developers. The 2012 interview guide focused on the formulation, communication, understanding and implementation of the sustainability requirements, while the 2021/2022 version placed greater emphasis on MEPR implementation and the energy performance outcomes of the buildings. For Papers 3 and 4, interview guides for local government representatives covered themes such as sustainability visions and goals for the project, planning instruments, follow-up practices, and learning. Guides for developers focused on land allocation processes, sustainability measures, and follow-up practices. A longitudinal perspective was encouraged by asking participants to reflect on how the projects and their involvement had evolved. In most interviews, participants were shown a visualisation of the energy performance data analysis (see Figure 7), including colour-coded maps representing performance outcomes at the building level. These visuals stimulated reflection and grounded the interview in concrete outcomes.

Most interviews were conducted online via Microsoft Teams due to COVID-19 restrictions in 2021/2022 and later due to logistical convenience,

as I was based in a different city than most participants. The online format improved participation rates and scheduling flexibility, although it came with limitations such as reduced ability to observe non-verbal cues and occasional disruptions in conversational flow (Bell et al., 2019). One interview was conducted asynchronously via e-mail, as the participant preferred not to participate in a live interview.

All interviews were conducted in Swedish, the participants' native language, to enable more detailed and nuanced responses. Thirty-five interviews were recorded and transcribed, while one was documented through detailed notes. As Braun & Clarke (2006) point out, transcription is often "time-consuming, frustrating and at times boring" (p. 87). Still, it is also essential to become familiar with the material. The analysis was done in Swedish and direct quotations were only translated into English during the writing stage to stay as close to the original as possible (Nikander, 2008). Further details on the analysis of the interview material are provided in Section 4.5.

Planning documents

While the semi-structured interviews offered rich and detailed insights into the perspectives and experiences of actors, they did not always provide a structured or comprehensive understanding of the formal sustainability ambitions, planning instruments, or the phases of the urban development projects. To address this gap, planning documents were systematically integrated into the research. These documents contextualised the interview material and gave a more complete picture of the institutional and policy context of the urban development projects. The documentation of planning processes is typically captured in written form, through a collection of texts or official records (MacCallum et al., 2019). Planning documents thus represent instructive sources, especially when combined with other empirical material (Flick, 2009).

Most documents were publicly accessible through local government websites or archives. However, in several instances, additional documents, such as internal follow-up or draft agreements, were requested directly from the local government representatives. Despite these efforts, not all documents could be accessed. Some materials had been removed from websites and replaced by revised versions. This made it occasionally challenging to reconstruct specific details of the planning process. An overview of the main planning documents analysed for each case is provided in Table 7. The documents were selected based on their relevance to the research questions of each

Table 7

Overview of the main planning documents per urban development project.

Kvillebäcken (Gothenburg)	Vallastaden (Linköping)	Brunnshög (Lund)
Urban planning programme Kvillebäcken (2002)	Architectural competition prospectus for Vallastaden (2012)	Framework programme (2006) Lund NE/Brunnshög vision and goals (2012)
Urban design programme (2008)	Idea programme (2012)	Brunnshög contract (2013)
Detailed development plan (2008)	OKIDOKI's plan for Vallastaden (2013)	Detailed development plans (2015, 2016, 2021)
Kvillebäcken agreement (2010)	Detailed development plan Vallastaden (2013)	Summary of visions and goals (2016)
Programme for environmental sustainability Gothenburg (2010)	Quality programme (2013)	Sustainability in Brunnshög: how the district reaches Lund municipality's goals (2022)
Sustainability programme for Kvillebäcken (2011)	What have we learned so far? (2018)	Documentation of 12 land allocation processes including prospectus and jury assessments (2010 – 2023)
Follow-up document of the sustainability programme for Kvillebäcken (2018)	Documentation of 9 land allocation processes including prospectus and jury assessments (2013 – 2022)	42 sustainability agreements between the local government and the developers (2017 – 2023)
Follow-up document of the planning process of Kvillebäcken (2019)	Idea programme for Eastern Vallastaden (2023)	Brunnshög contract 2.0 (2024)

paper and the need to understand the formal frameworks that guided or influenced energy and sustainability outcomes in each urban development project.

Beyond offering historical context and background on planning processes, as highlighted by Bowen (2009), the documents influenced the research process. They were used both before and after interviews. Initially, they informed the development of interview guidelines, enabling more focused and case-specific discussions with participants (Bowen, 2009). Subsequently, they were revisited during the analysis to verify or complement interview accounts, especially in cases where participants struggled to recall specific details or needed clarification. Importantly, using documents at different

stages of the research process allowed for a more critical engagement with the data. Further information on the analysis of the documents is provided in Section 4.5.

Energy data

Energy data is used as an additional empirical source of information, complementing interviews and planning documents to enable a more comprehensive evaluation of how energy policies are implemented in urban development projects. Energy data was used more qualitatively and interpretively, not as an isolated technical metric but as a discussion tool in interviews and interpretation. This approach enriched the empirical findings and enabled a more nuanced understanding of how energy requirements are interpreted and negotiated in planning practice.

I have used energy performance calculation and EPC data in all three case studies (see Table 8). For Paper 3, additional energy data on the district level were used from secondary sources (Krafringen, 2022; Moallemi et al., 2023). As described before, most interview participants were shown a visualisation of the energy performance data analysis. This visualisation included colour-coded maps representing energy performance classes at the building level, based on EPC data, similar to the map shown in Figure 7.

In Sweden, the building code requires that new buildings include an energy performance calculation as part of the building permit application process. The energy performance of the buildings in Vallastaden (Linköping) is calculated with *Energihuskalkyl*, a Swedish calculation tool for energy performance calculations, using standard figures provided by the local government of Linköping. In Kvillebäcken (Gothenburg) and Brunnshög (Lund), the developers were free to choose which tool to use, and consequently, the data is calculated with different calculation tools (e.g., IDA ICE). These calculations are stored in the local government's building permit archive, which can be requested for review. However, the availability of these calculations is sometimes a bit inconsistent, as not all energy performance

Table 8

Overview of energy data included per urban development project.

Kvillebäcken (Gothenburg)	Vallastaden (Linköping)	Brunnshög (Lund)
10 energy performance calculations	73 energy performance calculations	24 energy performance calculations
21 EPCs	49 EPCs	18 EPCs

calculations are systematically archived. Table 8 presents an overview of the number of buildings for which energy performance calculations were accessible.

Additionally, the building code prescribes that an EPC must be issued no later than two years after the building has been used (Boverket, 2021). An independent certified energy expert issues the EPCs following an on-site evaluation. Issuing an EPC is the responsibility of the building developer. The developer is responsible for the EPC for new buildings. The Swedish National Board of Housing, Building, and Planning (Boverket) oversees the system, maintaining EPCs in the Gripen database. While basic energy performance data is publicly available, researchers can access more detailed information through a research agreement. During the research process, I submitted four requests for data from Gripen (May 2021, September 2022, October 2023, and January 2025), ensuring I always had the latest EPC data in the analysis.

The leading indicator for energy performance in Sweden is the building's primary energy number, measured in kWh/m² per year. The primary energy number is calculated by multiplying the building's specific energy use by nationally defined weighting factors according to the Swedish building regulations (BBR). Specific energy use includes heating, domestic hot water, comfort cooling, and building operation electricity, excluding household or business electricity (Allard et al., 2021). Before 2019, EPCs were based only on specific energy use, but since 2020, revised weighting factors have increased differentiation. Measured energy data are normalised to represent standard occupancy and climate conditions. This involves correcting for differences in hot water use, indoor temperature, and internal heat gains, followed by climate adjustment to a normal-year average. The heating energy is then divided by a geographical correction factor, and the result is divided by the building's heated floor area. The resulting primary energy number enables comparison between buildings across Sweden and forms the basis for determining a building's energy performance class. EPCs use energy performance classes from A to G, with Class C corresponding to the current MEPR requirement for new buildings and each class representing a percentage deviation from Class C.

4.5 Analysis of the data

For the literature review (Paper 1), semi-structured interviews and the planning documents (Papers 2-4), I conducted a thematic analysis broadly following the six-phase approach outlined by Braun & Clarke (2006). The process began with familiarisation, involving repeated reading of the material to gain an overall understanding and identify potential points of interest. The transcription of the interviews was part of this. From this, I developed initial codes that captured recurring ideas and observations, which were refined and reorganised as coding progressed across the dataset. NVivo software was used to support the coding and manage the large material volume. Subsequent stages focused on reviewing, defining, and naming themes, moving iteratively between the data and the emerging structure of the analysis. This approach allowed both anticipated dimensions and unanticipated insights to be incorporated.

Each paper applied a distinct but overlapping analytical lens, reflecting the iterative and dialogical approach of this PhD research. The analytical framing evolved in response to the data collection and the theoretical insights developed (see Section 4.2). This evolution can be understood as a form of theory triangulation, whereby multiple theoretical perspectives were used to assess which provided the most explanatory power for the observed dynamics (Patton, 2015). In line with the dialogical theory-research relations model (Rule & John, 2015), the process was characterised by ongoing interplay between empirical findings and theoretical interpretation, with analysis and data collection informing each other.

Paper 1 used thematic analysis to identify seven themes in the literature and employed a socio-technical ecology perspective to frame the discussion of these results. The coding in this paper was exploratory and primarily aimed at mapping the breadth of the literature, which helped to clarify the initial research focus and situate the thesis within ongoing scholarly debates. Paper 2 applied the middle-out perspective (Janda & Parag, 2013; Parag & Janda, 2014), offering a way to analyse how actors' positions, relationships, and capacities shaped their ability to act within the implementation of MEPR. Coding focused on dimensions of agency and capacity, differences between developer types, and the project phases (development and use). This approach highlighted variations in how different actors navigated MEPR requirements and how their agency and capacity to influence outcomes changed over time. Paper 3 examined the planning and design of urban development projects

through a framework adapted from earlier work (Sareen et al., 2022; Squires & Heurkens, 2016), which distinguished four analytical levels: framework conditions, stakeholders, processes, and outcomes. Framework conditions set the broader context for PEDs, including institutional and energy system factors. Within this context, actors, ranging from public authorities to private actors and civic organisations, were identified and their roles examined. Coding traced how these actors coordinated, negotiated, and sometimes conflicted throughout the development process, with particular attention to collaborative governance and citizen involvement mechanisms. Outcomes were coded in terms of implemented energy measures and their related impacts, providing a basis for assessing how process dynamics shaped the eventual performance of PEDs. Paper 4 analysed land allocation as an experimental governance arrangement. Coding was guided by the three institutional capacity dimensions, which structured the examination of how land allocation was formalised, operationalised, and assessed in planning documents. While deductive in orientation, the analysis remained open to emergent patterns, particularly in tracing discrepancies between formal narratives and lived experiences. For instance, early planning documents often projected ambitious visions that later proved difficult to realise, highlighting temporal shifts in priorities or institutional capacity. These discrepancies provided insights into how planning processes adapt over time and where expectations diverge from implementation. Land allocation documents, in particular, were valuable for tracing these institutional and procedural changes, as they often link policy ambitions to practical execution. Comparing early and revised versions of such documents revealed evolving expectations for energy performance and changing implementation strategies. This allowed for a nuanced understanding of how institutional capacity was built and tested through land allocation practices.

At an overarching level, the analysis and discussion in Chapter 6 are guided by the concept of institutional capacity building, which provides a unifying lens for interpreting the results. Therefore, the discussion presented in this thesis goes beyond the individual papers, bringing together and extending their insights to develop a more integrated understanding of the roles of local governments and developers and institutional capacity building.

Energy performance calculations and EPCs were linked to additional building-related information for the energy data analysis, including the actors involved in each project (e.g., developer, architect, construction company), tenure type (rental, ownership, or condominium), and project-

Energy performance classes

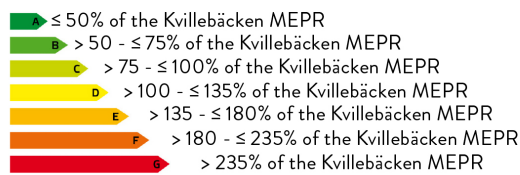


Figure 7

Energy performance classes of the Kvillebäcken properties. Energy performance data from EPCs have been reinterpreted using specific energy use relative to a reference value of 60 kWh/m² per year, corresponding to the stricter MEPR applied in Kvillebäcken. The classes were defined as percentage bands around this reference value to ensure consistency in the comparison of EPCs issued between 2015 and 2020. Adapted from Paper 2.

specific requirements. To enable meaningful comparison between buildings, energy performance was assessed using specific energy use, which provides a consistent measure across both calculated and EPC values and allows comparison of EPCs issued in different years, as suggested in previous research (Li, 2025). For Paper 2, energy performance classes were reinterpreted relative to the stricter MEPR applied in Kvillebäcken. Each building was then categorised into a class based on its percentage deviation from this reference, similar to the A-G structure of standard EPC ratings. This approach provided a uniform basis for comparison across properties, ensuring consistency despite shifts in calculation methods and reference values over time. The Kvillebäcken energy performance map based on these EPC-derived classes is presented in Figure 7.

4.6 Ethical considerations

Ethical considerations and guidelines serve as contexts for reflection on the ethical decisions throughout the research process (MacCallum et al., 2019). As the Swedish Research Council (2025) describes in the Good Research Practice 2024 publication, all researchers should discuss ethics issues actively

(Swedish Research Council, 2024). Ethical guidelines outlined in Section 16 of the Act (2003:460), Concerning the Ethical Review of Research Involving Humans (the Ethical Review Act), were taken into account throughout the research process (Görman, 2024). All individuals recruited to participate in the research received clear, comprehensive, and objectively formulated information about the research project by e-mail before the interview and orally at the start of the interview. This included details about the overall research plan, its purpose, the methods used, my role and identity, and the voluntary nature of participation, including participants' right to withdraw at any time without consequence. Informed consent was obtained from all participants. As the research involved recorded interviews, oral consent was used and documented through audio recordings. This approach was chosen following the accepted practices outlined in the ethical regulations, which allow for non-written consent forms when appropriate. All participants received sufficient information about the study to make an informed decision about their participation, and consent was obtained in a manner that emphasised the voluntary nature of their involvement.

The data was collected and stored in compliance with the EU General Data Protection Regulation (GDPR, 2016/679). Throughout the research, all handling of personal data, including collection, storage, processing, analysis, and deletion, was carried out following the principles and requirements set by the GDPR. The processing of personal data was based on a legitimate and clearly defined purpose, and no more data than necessary was collected. All personal data used in the research was retained only for the duration required to fulfil those purposes. Appropriate measures, including pseudonymization, were implemented to protect the integrity and confidentiality of the data. When the material from the interviews was presented, all participants were anonymised, and details that might reveal their identity were as much as possible excluded from the material presented. Furthermore, no sensitive personal data or personal data concerning legal violations was collected or processed. Therefore, ethical approval under the Ethical Review Act was not considered necessary when conducting the interviews. The studies were carefully structured to avoid including such data at all stages, and no such information was gathered or handled during the research process.

Authorship for the papers has been determined following the Vancouver recommendations and authorship criteria. All individuals listed as authors have made substantial contributions to at least one of the following: the design of the study, data collection, analysis or interpretation of results, the

drafting or critical revision of the publication, approval of the final version, and acceptance of accountability for the integrity of the work. Authorship responsibilities and order were discussed and agreed upon early in the project to ensure transparency and fairness. A CrediT (Contributor Roles Taxonomy) author statement is given at the end of each paper to share an accurate and detailed description of the diverse contributions to the paper.

This research has been conducted in line with open access principles. The papers are published with open access or are submitted to journals offering open access publishing. This was possible because of the Chalmers library's publishing agreements for researchers at Chalmers.

CHAPTER 5

Overview of papers

The four papers in this thesis contribute to a better understanding of institutional capacity building in sustainable urban development projects. Papers 1, 2, and 3 have been published in peer-reviewed journals. Paper 4 has been submitted to a peer-reviewed journal and is under review after a first revision round. A summary of each paper is presented in this chapter.

Paper 1: Energy systems in sustainability-profiled districts in Sweden: A literature review and a socio-technical ecology approach for future research

Paper 1 is a semi-systematic literature review that aims to synthesise the current knowledge regarding the planning, development, and evaluation of energy systems in sustainable urban development projects in Sweden over the past 30 years. The paper found that this topic is highly interdisciplinary, encompassing fields like urban planning, energy science, and political science, resulting in fragmented knowledge and a lack of integrated lessons learned. By reviewing 70 journal and conference articles published between 2003 and 2021, the paper provided an overview of research conducted across 13 Swedish urban development projects, with Hammarby Sjöstad, Western Harbour, and Stockholm Royal Seaport being the most frequently studied projects. The review identified seven major themes: (1) Conceptualisations and critique of sustainability-profiled districts, (2) Evaluations of energy goals and requirements, (3) Technical and economic assessments of heating and electricity systems, (4) Integration of innovative (energy) solutions in urban planning, (5) Stakeholder perspectives on energy systems, (6) Stakeholder collaboration on the building and the district level, and (7) Governance and policy instruments for sustainable urban development and energy systems.

The analysis highlights an evolution in the conceptualisation of sustainable urban development projects, shifting from an early focus on technical eco-

districts and models like the Hammarby eco-cycle model toward more integrated conceptualisations that include social values, lifestyles, affordability, and inclusion. A common challenge identified across the literature relates to meeting ambitious energy goals. While the urban development projects often enforce stricter energy performance requirements than national codes, studies reveal that these goals are frequently not achieved due to inaccurate energy calculations and lack of mandatory monitoring and enforcement. Drawing on the socio-technical ecology approach, the paper observes that while social and technical components are increasingly integrated in research, there is a recurring lack of ecology and nature in the analysis, even though energy systems rely on ecological resources.

Based on these findings, the paper proposes several directions for future research and policy to promote a more comprehensive and sustainable development of local energy systems. Key policy implications include the necessity of new or better-adapted energy indicators to enhance the agency and knowledge of all actors. Furthermore, future research must examine the perspectives, roles, and collaboration dynamics of new actors, particularly users/residents and decentralised owners, to develop effective governance and business models. Finally, the paper advocates for extending the socio-technical approach to explicitly include ecology, potentially using concepts such as energy ecosystem services, to ensure that place-specific ecological prerequisites are accounted for in energy systems research and urban development. The paper concludes that applying an arena perspective can help structure future research by fostering an integrated understanding of the complex relations between spatial scales, developmental phases, and resulting impacts.

Paper 2: Implementing minimum energy performance requirements ‘from the middle’: shifting levels of agency and capacity of housing developers in Sweden

Paper 2 analyses the implementation of MEPR for new buildings, a key instrument of the EPBD. The study uses a longitudinal case study approach, following seven housing developers involved in the Kvillebäcken urban development project in Gothenburg, Sweden, between 2002 and 2019. Drawing on the middle-out perspective, the study combines energy performance data, planning documents, and two rounds of developer interviews (2012 and 2021/2022) to examine how developer motivations and priorities (agency) and capabilities (capacity) affect compliance with MEPRs across the development and use phases. Findings show an energy

performance gap between calculated energy performance and energy performance outcome, with the average gap across the ten properties being 33 %. Only 24 % of the 21 residential properties met the stricter local MEPR of 60 kWh/m² per year applied in Kvillebäcken.

The analysis reveals a shift in the developers' roles and influence over time. Agency and capacity are relatively high for all developers during the design and construction phase, often driven by agreements with local governments. However, developer agency and capacity decline over time, particularly for those building to sell. Developers who build to manage tend to exhibit higher agency for implementing energy measures because they benefit directly from long-term operational savings. Conversely, developers who build to sell often view MEPR compliance as merely a project goal achieved at handover. Once the building is sold, the responsibility for energy management transfers to bottom actors, such as condominium associations or residents, resulting in a low capacity for the original developer to ensure the MEPR is met during the operational phase. Furthermore, the study notes that the effectiveness of the local MEPR was undermined by the absence of follow-up or enforcement from the local government after the design stage, contributing to a *design for compliance culture*¹⁰.

To address these implementation challenges, the paper proposes four key policy recommendations. These include: (1) Verifying both calculated and measured energy performance using high-resolution or smart meter data to support consistent enforcement and evaluation; (2) Clarifying responsibilities across national and local levels, integrating MEPR verification into mandatory inspections and post-occupancy monitoring to close accountability gaps; (3) Strengthening operational energy management by extending accountability for developers who build to sell, ensuring post-occupancy feedback loops are established; and (4) Improving EPC reliability by standardizing methodologies based on measured values. The findings underscore that meeting MEPRs requires active engagement and support not only from local government enforcement but also from residents and energy managers.

¹⁰ A design-for-compliance culture refers to a project approach in which actors engage primarily to meet formal design-stage requirements, with interest and involvement typically ending once their contractual or procedural responsibilities are fulfilled (Bordass, 2020; Cohen et al., 2017).

Paper 3: Towards a positive energy balance: a comparative analysis of the planning and design of four positive energy districts and neighbourhoods in Norway and Sweden

Paper 3 investigates how ambitious energy goals are implemented in the planning and design phases of four urban development projects: Ydalir and Verksbyen in Norway, and Vallastaden and Brunnshög in Sweden. These projects aim for PEDs, integrating four key elements: energy efficiency, local renewable energy generation, energy storage and flexibility, and energy sufficiency. The comparative case study utilises an analytical framework focusing on framework conditions, stakeholders, process, and outcomes, drawing on document analysis and interviews with key actors, including local governments, developers, and energy companies. The results confirm that integrated spatial and energy planning is complex and highlight the importance of tailoring energy measures to specific contextual factors, such as local climate and existing energy infrastructure.

The analysis of project outcomes reveals that all four cases successfully implemented measures for high energy efficiency (often surpassing national building codes, sometimes achieving passive house standards) and employed renewable energy generation, primarily through building-integrated PV. Developing a clear master plan or overarching programme for the district, setting forth these ambitions and goals early on, was the most significant factor in achieving PEDs by fostering goal alignment among diverse actors. For the Swedish cases where the local government owned the land, land allocation competitions were an effective planning tool to impose stricter energy requirements. Conversely, the paper found that measures related to energy flexibility and sufficiency at the neighbourhood or district scale were insufficient across the cases, often limited by existing regulations, such as legal barriers to sharing power between buildings.

Despite the early focus on ambitious energy goals, a key finding relates to challenges in accountability and monitoring. The study highlights a lack of follow-up procedures by local governments to ensure developers meet energy requirements after construction, and consequently, a lack of consequences for failing to achieve planned energy performance. Furthermore, while actor involvement (developers, architects, energy specialists) was broad during the initial conceptual phase, citizen involvement regarding energy ambitions was generally low in all four projects, often limited to providing information rather than co-creating energy solutions. The study concludes that effective PED implementation requires strengthening follow-up procedures, integrating

energy and urban planning more fully, and improving the capabilities of initiating actors (like local governments and developers) in collaborative governance and citizen engagement.

Paper 4: Building institutional capacity through experimentation in sustainable urban development projects in Sweden

Paper 4 examines how local governments utilise experimentation within land allocation processes to advance sustainable urban development. This study is particularly relevant because a 2015 national legal reform limited the ability of local governments to impose local sustainability requirements via traditional planning instruments, making land allocation one of the few remaining planning instruments to influence developers. The paper draws on a multi-sited case study of two Swedish urban development projects with high sustainability ambitions: Vallastaden (Linköping) and Brunnshög (Lund). It uses an analytical framework linking experimentation to institutional capacity, focusing on three dimensions: knowledge resources, relational resources, and mobilisation capacity.

The results demonstrate that experimentation is the primary mechanism for translating broad sustainability goals into actionable practices. Regarding knowledge resources, local governments used trial-and-error approaches in successive land allocation competitions to test evaluation methods and refine sustainability criteria, moving from rigid point systems to more flexible, vision-based assessment frameworks. This process generated learning through local governments observing developer behaviour and adjusting their approaches, although formal strategic documents often provided limited guidance. For relational resources, experimentation occurred through varying collaboration forms with developers, such as adjusting plot sizes to encourage diverse participation, establishing coordination meetings, and using *anchor developers*¹¹ for co-shaping visions. Local governments continually navigated the tension arising from their dual roles as planning authorities and market-dependent landowners. This led to experimentation with instruments like sustainability contracts in Brunnshög to formalise commitments, despite the friction they sometimes created by reducing flexibility for developers.

11 An anchor developer (*ankarbyggherre*) is a developer who, early in an urban development process, represents the developer side for an entire block or area and takes a leading role before individual land allocations are made. The role involves assuming a proactive and coordinating function, often acting as a support and representative for future developers while helping to drive the planning process forward.

Regarding mobilisation capacity, land allocation procedures functioned as institutional arenas where local governments tested strategies to secure and enforce commitments, including incentive mechanisms, contractual obligations, and financial penalties. However, the paper finds that institutional capacity remains limited when experimentation is weakly integrated with formal governance structures. Challenges include a lack of follow-up procedures after the initial design and land allocation phases, difficulties enforcing agreements, and inconsistent implementation of monitoring tools like certification schemes. Over time, both projects shifted toward tangible aspects like architectural quality and physical design, which were easier to monitor and evaluate. The conclusion is that while experimentation enables learning and collaboration, embedding these practices within formal structures is essential to avoid fragmented outcomes, close accountability gaps, and strengthen institutional capacity for long-term sustainable urban development.

CHAPTER 6

Analysis and discussion of the findings

In this chapter, I synthesise and extend the findings from the four papers, moving to a broader and integrated analysis. The chapter addresses three main analytical themes. First, I examine local governments' and developers' fragmented and distributed roles and responsibilities, highlighting how these shape planning and energy policy implementation. Second, I evaluate institutional capacity building for sustainable urban development across the three case studies, including the potential and limitations of experimentation. Finally, I discuss energy policy as a lens for understanding broader planning processes, showing how regulatory frameworks, targets, and instruments interact with local practices to influence outcomes.

6.1 Fragmented and distributed roles and responsibilities of local governments and developers

This section explores how the roles and responsibilities of local governments and developers for sustainable urban development are distributed and often fragmented. Drawing on the results from Papers 2, 3, and 4, it highlights the dual role of local governments as both planning authorities and landowners, and how these roles are used to promote sustainability. It also examines how developers navigate and respond to sustainability demands, influenced by regulation, market conditions, and ownership models.

Local governments in their dual role as planning authorities and landowners

Papers 2, 3, and 4 highlight two central roles of local governments in sustainable urban development: planning authority and landowner (Kalbro et al., 2015). As planning authorities, local governments are responsible for steering urban development through statutory planning instruments such as the detailed development plan and building permits. These responsibilities

are framed by national regulations, particularly the Swedish building regulations, including the MEPR. Paper 2 reveals fragmentation in how MEPR responsibilities are distributed across governance levels. While national authorities set the MEPR (based on the EPBD) and oversee the EPC system, local governments are responsible for verification and enforcement. Yet the paper shows this role is underutilised, leading to weak oversight. Local governments rely on design-stage compliance rather than performance-based monitoring. This contributes to a design-for-compliance culture, where developers fulfil energy requirements only at the design stage, without performance monitoring after construction. Papers 3 and 4 highlight the lack of capacity and systems to enforce compliance during the operational phase. The current fragmentation of responsibilities highlights the need for improved policy integration and clearly defined roles across national and local levels. To strengthen enforcement, the national implementation of the EPBD should explicitly assign responsibilities and, where feasible, link MEPR compliance to existing mandatory building inspections or audits post-construction. In line with this, Wahlström et al. (2020) argue for a verification of energy performance both before final consultation, using calculations or an energy performance certificate, and again two years after occupancy through measured energy use. Unlike current legislation, the proposal introduces a stronger link between final approval, energy certification, and consequences for non-compliance. If the building fails to meet energy requirements, the Swedish National Board of Housing, Building, and Planning (Boverket) may issue a conditional fine (Wahlström et al., 2020).

Since the 2015 legal reform that prevents local governments from setting stricter standards than national regulations, local governments have increasingly used their role as landowners to promote sustainability goals (Caesar, 2016; Francart et al., 2019). Papers 3 and 4 show that public land ownership is one of the few tools available that can require developers to meet higher sustainability ambitions than those set nationally. This aligns with earlier research highlighting the increasing role of landownership in enabling sustainable urban development, both in Sweden and internationally (Brokking et al., 2020; Buitelaar et al., 2014; Caesar, 2016; Candel & Paulsson, 2023; Högström et al., 2023; Krigsholm et al., 2022; Lähtinen et al., 2024; Puustinen et al., 2025; Singhapathirana et al., 2022). As landowners, local governments have multiple ways to influence developers, including attracting, communicating, collaborating, or exerting control through land allocation processes, as illustrated in Papers 3 and 4. Previous research identifies a

variety of roles local governments may adopt, ranging from enablers and facilitators to regulators and guardians (Bulkeley & Kern, 2006; Eneqvist & Karvonen, 2021; Kronsell & Mukhtar-Landgren, 2018; Smedby & Quitzau, 2016). In the early stages of development, planning instruments such as competitions, dialogue forums, contract negotiations, and incentive schemes allow local governments to exercise supportive and enabling roles, shaping developer behaviour and embedding sustainability ambitions. However, using land ownership to impose stricter sustainability requirements, such as higher energy performance standards, exists in a legal grey area. Papers 2, 3, and 4 show that failure to meet agreed sustainability criteria often has no formal consequences, and once land is allocated, local governments' influence diminishes. Consequently, implementing sustainability objectives relies mainly on developer motivation and engagement. This dynamic exemplifies what Haderer (2023) and Torrens & von Wirth (2021) describe as organised irresponsibility, where local governments delegate substantial responsibility for sustainability outcomes to developers while making limited use of their formal regulatory power.

The findings on the roles and responsibilities of local governments reflect broader international concerns. For example, Peacock & Allmendinger (2021) highlight how, in the UK, responsibility for the implementation of sustainable urban development has increasingly shifted from the public sector to private developers, where local governments are dependent on negotiations with developers "to deliver sustainable development" (p. 188). Paper 4 demonstrates that local governments face challenges in navigating their dual role as regulators and landowners, particularly when trying to maintain flexibility and control. Their dual role, being both regulator and landowner, raises concerns about legal clarity and legitimacy (Olsson, 2018), a challenge seen in other countries where public land development is common (Valtonen & Falkenbach, 2025; Woestenburger et al., 2019). In response, the Swedish local governments have started to explore tools such as penalties in land allocation agreements and new opportunities within their formal regulatory powers.

This thesis did not explicitly examine the roles of local governments as infrastructure providers or as owners of public housing companies, as defined by Kalbro (2015). However, the analysis of the papers shows that there is further potential to integrate these roles in the implementation of sustainable urban development by, for example, collaborating with new actors such as LECs and decentralised owners, as shown in Paper 1. Regarding their

role as public housing companies, public housing development has been recognised as an important tool to generate public revenue and as a form of market intervention to address issues like housing affordability (Peacock & Allmendinger, 2021). Storbjörk et al. (2018) showed that public housing companies could emphasise their long-term responsibility to serve the public interest rather than seeking short-term profits since these companies typically build to own and manage properties over long timeframes. Initial investments may not be profitable for many years, but over time, they support broader public benefits and future projects (Storbjörk et al., 2018). This extended perspective enables them to invest in more sustainable buildings from the outset, reflecting different priorities compared to other developers.

Developers holding substantial responsibility over the implementation of energy policies

The findings across the papers confirm that developers are key actors whose decisions during planning, construction, and post-construction phases impact the implementation of energy policies. However, their responsibilities and motivations vary, shaped by ownership structures, business strategies, regulatory contexts, and market conditions. Consistent with earlier research (Candel & Törnå, 2021; Creagh et al., 2019; Hedborg & Rosander, 2023; Karrbom Gustavsson et al., 2023; Leffers & Wekerle, 2020; Peacock & Allmendinger, 2021), the papers found that the primary responsibility for many developers is securing financial return on investment. This economic driver often determines how much they engage with sustainability goals. Papers 2 and 4 show that energy policy implementation aligns with these interests when sustainability contributes to financial or branding advantages, such as reduced energy costs, securing green loans or strengthening their corporate image. Paper 4 notes that some developers actively monitor energy performance post-construction, particularly as a marketing strategy for future land allocations to demonstrate their ability to realise sustainability ambitions.

Beyond financial obligations, developers' responsibilities in sustainable urban development are shaped by planning regulations and the negotiated terms in land allocation agreements. As shown in Paper 2, stricter MEPR requirements in the Kvillebäcken agreement influenced developers' willingness to commit to sustainability goals. In Brunnshög and Vallastaden, developers often responded reactively, complying with sustainability requirements to secure land access through land allocation processes. Linking sustainability demands to land allocations can steer developer behaviour, but usually only

when market interest and competition are present (Brokking et al., 2020). Paper 4 found that developers prefer design flexibility, while early demands or commitments can lead to resistance or renegotiation. This duality echoes Storbjörk et al. (2018), who distinguish between reactive compliance and evasive responses to regulation. These dynamics highlight the need for nuanced governance arrangements that account for regulatory constraints and developer motivations. In line with the middle-out perspective, Buitelaar et al. (2025) argue that developers are not passive recipients of rules but can act as institutional entrepreneurs, strategically shaping planning frameworks to align with their interests. As Candel et al. (2021) note, constructive negotiation between developers and local governments can transform conflicts into opportunities for policy learning and innovation, a process exemplified in Paper 4 through the collaborative role of anchor developers in shaping urban development strategies.

A distinction in types of developers was found in Paper 2, which shows that build-to-sell developers mainly focused on short-term outcomes and typically disengage after construction is completed. Their compliance with MEPR is often limited to the design phase, resulting in a design-for-compliance approach, shifting responsibility for energy performance to residents or condominium associations. In contrast, build-to-own developers retain responsibility for a building's operational costs and thus have more substantial incentives to ensure systems function efficiently. Nevertheless, technical complexity and a lack of energy management skills remain barriers. These differences highlight the importance of aligning developer accountability with the whole building lifecycle, not just the design phase. Paper 2 points to extended accountability, shifting the focus from design-stage compliance to verified long-term building performance. By introducing mechanisms such as commitment agreements, post-occupancy verification, and financial consequences for non-compliance, accountability can be broadened to include developers' and building owners' responsibilities for operational outcomes, fostering a *design-for-performance culture*¹² supported by continuous monitoring and feedback.

In summary, the papers highlight the need for more substantial institutional alignment and accountability in defining roles and responsibilities in sustainable urban development projects. While developers are responsible

12 A design-for-performance culture refers to an approach in which buildings are designed, constructed, and managed to achieve verified in-use performance targets, with accountability extending beyond the design phase (Cohen et al., 2017).

for implementing energy policies, their commitment is often driven by financial incentives and market conditions. Local governments face the dual challenge of acting as regulators and landowners, and legal and institutional constraints limit their capacity to enforce sustainability goals. Enhancing the implementation of sustainability ambitions requires a more consistent and coordinated public role that combines facilitation with clear enforcement, underpinned by accountability that extends into the operational phase of buildings.

6.2 Institutional capacity building in sustainable urban development projects

Building on the previous discussion of fragmented and distributed roles and responsibilities, this section turns to the question of how governance arrangements shape institutional capacity to implement sustainable urban development. Since the 2015 legal reform that restricts local governments from setting stricter sustainability standards than national regulations, local governments have faced growing limitations in using formal planning instruments to implement more ambitious energy policies. In response, local governments have increasingly turned to more informal and project-based governance arrangements – project-specific sustainability visions and goals and land allocation processes – to steer urban development. Drawing on Healey (1998) and De Magalhães et al. (2002), this section evaluates how project-specific sustainability visions and goals, along with land allocation processes, serve as the two main governance arrangements that influence institutional capacity by developing knowledge resources, relational resources, and mobilisation capacity in the case study projects. It also discusses the potential and limitations of experimentation within these governance arrangements to contribute to institutional capacity building.

Project-specific sustainability visions and goals as a key governance arrangement

Project-specific sustainability visions and goals, often formulated in quality and design programmes for the urban development project, are a key governance arrangement in sustainable urban development projects. These visions and goals are used as coordinating frameworks that embed sustainability principles within planning processes. As highlighted in Paper 3 and supported by previous research (Brokking et al., 2020; Carlander & Thollander, 2023; Högström et al., 2019), early development of visions and goals is crucial. The three case studies illustrate different ways project-

specific visions and goals have been used in planning instruments and as knowledge bases:

- Kvillebäcken formalised its sustainability ambitions through the Kvillebäcken Agreement (2010) with the seven developers and a Sustainability Programme (2011), linking project-specific goals to the Gothenburg sustainability programme. The Kvillebäcken Agreement and Sustainability Programme included specific requirements such as *Miljöbyggnad* level Silver certification (level Gold for energy), aiming for an MEPR of 60 kWh/m² per year. Follow-up checklists were established later on in the project.
- Vallastaden developed a quality programme linked to its detailed development plan, outlining fifteen thematic areas, each containing several detailed requirements and recommendations with assigned responsibilities. Eight requirements and six recommendations were related to energy, including the energy performance requirement, which was set at 25 % lower than the applicable standards in the Swedish building regulations (BBR 2012), and the requirement that heating for hot water, residential buildings, and other buildings will be supplied by district heating. The quality programme was used as an appendix in the land allocation processes.
- Brunnshög initially set broad goals in a vision and goals document, emphasising three core principles, one of which includes energy: Minimise the impact of climate change. Specific concepts such as *the city as a power plant* were introduced (later updated to PED), and more specific energy performance requirements were linked to the Lund/Malmö sustainability programme. The ambitions were also part of a collaboration contract with the local energy company. The land allocation processes refer to the overarching goals but include different criteria for energy performance and building certification.

In all three cases, the project-specific sustainability visions and goals were closely aligned with higher-level policy frameworks, such as municipal climate targets or local sustainability programmes, reflecting clear hierarchical linkages (Adolfsson et al., 2021). Each case also demonstrated experimentation and learning, evident in follow-up documents, revised contracts, or reframed visions and goals. Translating sustainability goals into actionable practices, such as land allocation processes, tends to be open-ended, allowing for trial-and-error approaches and adaptation as conditions change. However, there are often no or very limited formal follow-up

frameworks to ensure that sustainability visions and goals are consistently maintained over time, as was also found by Holmstedt et al. (2017).

Beyond providing a knowledge base, the project-specific sustainability visions and goals helped build relational capacities by establishing frames of reference with regards to sustainability. As Holmstedt et al. (2017) and Nielsen et al. (2019) note, many sustainability goals extend beyond the direct control of local governments, making the willingness, engagement, and alignment of other actors essential. Wenander (2024) found that developers were involved in the formulation of visions and goals, while the participation of residents and other local actors was limited – an observation also supported by Paper 3. Planning documents from each case typically included definitions of responsibilities, most often assigned to developers or energy companies for the energy-related ambitions and goals. Project-specific sustainability visions and goals were frequently integrated into land allocation processes and collaboration contracts with energy companies, embedding them further into the planning processes.

The capacity to mobilise action regarding the project-specific sustainability visions and goals has proven to be limited in the case studies. A weakness lies in the insufficient alignment of these visions and goals with planning instruments such as detailed development plans and land allocation processes. Without strong contractual anchoring or clear frameworks for monitoring and follow-up, the sustainability visions and goals gradually lost relevance over the long urban development processes. For example, in Kvillebäcken, the initial ambition to apply *Miljöbyggnad* level Gold certification for energy was framed as an exception, since the Silver level applied to other sustainability themes, resulting in it being overlooked later. Similarly, in Vallastaden and Brunnshög, regulatory changes in 2015 undermined the ability to uphold initial sustainability requirements. In both cases, early goals lost importance or were replaced with less formal commitments, such as website statements or new formulations in land allocation documents. To improve the mobilisation capacity of project-specific sustainability visions and goals, clear and consistent strategic goals should be combined with flexibility in how these are implemented, allowing adaptation as conditions evolve (Vigar et al., 2020). Continuous learning and follow-up are essential for keeping visions relevant and actionable over time (Gustafsson & Andréen, 2018).

The underutilised potential of detailed development plans concerning the sustainability visions and goals was highlighted in Papers 3 and 4. Research has shown how detailed development plans can optimise energy performance by embedding design parameters such as building heights or roof orientations, and solar energy by embedding features like building heights or roof orientations (Kanters & Wall, 2018; Nielsen et al., 2019). Findings from Paper 4 indicate a shift towards architectural quality and physical design in land allocation processes, reflecting a response to the challenges local governments face in enforcing and monitoring project-specific sustainability visions and goals. As Puustinen et al. (2025) emphasise, realising sustainability goals requires that detailed development plans, building control regulations, and other planning instruments are connected within a coherent strategy.

Another finding from this thesis is that more thorough use of environmental certification systems as flexible and outcome-oriented planning instruments could strengthen institutional capacity to implement sustainability visions and goals. Rather than relying on project-specific sustainability requirements, encouraging developers to pursue recognised certifications can maintain high sustainability standards while promoting innovation and reducing administrative complexity. As Gustafsson & Andréén (2018) argue, sustainable outcomes depend on creating mutually beneficial arrangements that motivate diverse actors and building a shared understanding across differing visions, values, and motivations. Certification systems, such as *Miljöbyggnad* and BREEAM, can serve as a more attractive and practical mechanism by linking environmental goals to market incentives and broader industry standards. However, their effectiveness in the case studies is undermined by inconsistent local enforcement, weak follow-up after the design phase, and the dilution of certification requirements in practice. As illustrated in Kvillebäcken and Brunnshög, the absence of consequences for non-compliance, fragmented municipal procedures, and the tendency to treat certification as a design-stage formality weaken credibility and limit the transformative potential of certification systems as planning instruments.

Land allocation processes as a key governance arrangement

The land allocation processes are the second governance arrangement through which institutional capacity for sustainable urban development is built. The cases of Vallastaden and Brunnshög illustrate how land allocation has evolved into a more strategic governance arrangement, especially following Sweden's 2015 legal change that limits local governments' ability

to impose stricter (sustainability) requirements. In both cases, the project-specific sustainability visions and goals function as knowledge resources guiding the urban development process. While land allocation provides a key opportunity to translate sustainability ambitions and goals into concrete action, the visions and goal documents often lack guidance on operationalising these ambitions through land allocation. Local governments experiment with different planning instruments within land allocation to build capacity at the start of the developer projects, including different scoring systems, open-ended visions, and sustainability agreements.

Land allocation processes build relationships, generate interest, and involve a broader range of developers, including smaller actors. Paper 4 found a shift toward more adaptive and cooperative approaches, in which the local governments balance their roles as planning authorities and landowners. While this has allowed for greater responsiveness to developers' ideas, it has also led to tensions around the level of control and the risk of losing sight of long-term sustainability goals. Efforts to formalise commitments through sustainability contracts help clarify expectations but can clash with developers' preference for design flexibility during early project stages. This tension between the need for control and the desire for adaptability creates challenges, as developers tend to resist early binding commitments. At the same time, local governments seek clear agreements to secure sustainability objectives. This aligns with Isaksson & Heikkinen (2018), who describe how contracts with developers initially acted as a "unifying force for various efforts to achieve ecological sustainability" (p. 11), enabling rapid mobilisation. However, resistance from developers led to compromises and lower ambitions, weakening the contracts' transformative potential and sidelining more challenging sustainability issues (Isaksson & Heikkinen, 2018).

Mobilisation capacity, combining knowledge and relational resources into collective action, is often limited in land allocation due to weak institutional integration and limited enforcement. While land allocation provides opportunities for experimentation and innovation, it often lacks structured feedback, legal enforceability, and links to broader governance frameworks. Papers 2 and 3 show that many buildings fail to meet energy performance targets. Key regulatory instruments, including building permits and EPC requirements, are rarely integrated into follow-up, limiting their effectiveness. Paper 4 shows that local governments have introduced mechanisms such as sustainability agreements, incentive-based compliance, and penalties.

Krigsholm (2025) argues that for effective use of land policy it requires that broad sustainability goals are translated into clear objectives and specific requirements; without this link, land allocation risks being reactive rather than a proactive instrument for advancing urban sustainability.

Frontloaded capacity in sustainable urban development projects

The findings show that project-specific sustainability visions and goals and land allocation processes constitute the two primary governance arrangements for building institutional capacity for sustainable urban development. However, their influence tends to be frontloaded, concentrated in the early planning and design stages but have limited impact during implementation. This form of frontloaded capacity generates strong momentum at the project initiation yet often fades as the urban development projects transition to implementation and maintenance faces. Follow-up mechanisms are often weakly institutionalised and reliant on non-binding commitments, contributing to an implementation gap.

To contribute to closing the implementation gap, sustainable urban development projects need to be better integrated into formal institutional structures. The papers also demonstrate that experimentation has become a central means for increasing institutional capacity in response to uncertainties and shifting conditions, including evolving regulations, economic fluctuations, and emerging sustainability agendas. As illustrated in Paper 4, experimental strategies enable local governments to respond flexibly and adapt to changing circumstances. A concern emerging from the analysis is that experimentation, rather than transforming governance structures, can serve as a compensatory strategy to cover legal, institutional, and resource constraints. The involvement of external actors in follow-up in Vallastaden and anchor developers in visioning in Brunnshög can be seen as an example. As Roggero (2025) notes, experimentation often compensates for formal authority or capacity gaps, enabling local governments to navigate restrictive frameworks without fundamentally questioning them. This compensatory role comes with trade-offs: experiments risk being co-opted to prioritise short-term economic or political gains, sidelining longer-term priorities such as equity and environmental justice (Ehnert, 2023; Haderer, 2023). While experimentation can provide flexibility, it should not be mistaken for a substitute for robust legislation, regulation, or political vision (Isaksson et al., 2022). Effective governance encourages experimentation by supporting creativity, learning from success and failure, and maintaining control and flexibility (Healey, 2004).

6.3 Energy policies to evaluate sustainable urban development

This thesis shows that energy policies provide a valuable entry point for assessing how sustainability goals are implemented in urban development projects. They often include specific, quantifiable goals and offer insights into institutional capacity, actor roles, and multi-level governance structures. Using MEPR evaluation through EPC data can help to evaluate energy efficiency outcomes and initiate discussions around the governance and regulatory frameworks for sustainable urban development. This approach offered insight into the multilevel governance context in which local governments operate and highlighted how national energy policies are interpreted and implemented locally. This section discusses the limitations of MEPR and EPC and energy policies beyond the building scale.

Limitations of the MEPR and EPC

The primary energy policies assessed in this thesis are the MEPRs and EPCs. While the MEPR is central in guiding energy-efficient construction in Sweden, analysing its application within sustainable urban development projects reveals several limitations. The MEPR is calculated based on the building's specific energy use in kWh/m² per year, where the measured energy for heating is first normalised to reflect typical occupancy and climate conditions, then adjusted with a geographical correction factor and multiplied by weighting factors for different energy carriers. While this method aims to ensure comparability across buildings, it also embeds normative and political assumptions about what constitutes normal use and what forms of energy are valued. As discussed in Paper 3 and supported by previous studies (Bilardo et al., 2022; Swing Gustafsson et al., 2016), the validity of the weighting factors is contested. The choice of allocation methods, the valuation of different energy sources, and political considerations influence how these factors are determined. Bilardo et al. (2022) note that political priorities shape the factors more than the technical or environmental characteristics of energy generation across Europe. This raises concerns about MEPR relevance, transparency, and comparability across different contexts.

Although most EPCs in Sweden today are based on measurements (Karlsson Hjorth et al., 2022), both Paper 2 and earlier research (Pasichnyi et al., 2019; von Platten et al., 2019) show that results can vary significantly depending on the expert conducting the assessment and their methodological assumptions. Such inconsistency reduces the credibility of EPCs and introduces uncertainty

when using EPC data. Holmstedt et al. (2018) suggest integrating dynamic and high-resolution metering data into assessments to improve accuracy, capture variations in consumption patterns, and provide more granular and real-time insights. This thesis demonstrates that EPC data can be a valuable tool for verifying building performance and tracking policy outcomes. Still, improvements are needed: EPCs should be issued using more transparent and harmonised methodologies, emphasising measured energy performance, ideally supported by smart metering.

Energy policies beyond the building scale

Many energy policies continue to focus on the building scale, addressing energy efficiency standards, building codes, and certification systems. However, there is growing recognition that sustainable energy systems require a broader approach that extends beyond individual buildings to neighbourhoods, districts, and urban systems (De Pascali & Bagaini, 2019; Derkenbaeva et al., 2022). Energy flexibility, building interactions, load matching, and grid interaction can enhance the local utilisation of renewable energy sources (Guarino et al., 2023). The EU promotes LECs and PEDs to meet energy and climate targets (Kojonsaari & Palm, 2021). The case studies presented in this thesis show that energy policies beyond the building level remain limited. Energy efficiency measures and renewable energy generation, such as solar PV, are commonly implemented in individual buildings. Measures to promote energy flexibility, such as shifting or balancing energy loads across multiple buildings or coordinating local generation and consumption, are often lacking. Legal and regulatory barriers limiting energy sharing between buildings can partly explain this gap. Since 2022, it has become possible in Sweden to share energy between buildings on the same or adjacent properties. New EU legislation further mandates that by 2026, electricity customers must be able to share renewable energy through the public grid, requiring legal changes that are currently under development in Sweden.

Paper 3 also highlights the importance of energy sufficiency, which Krähmer (2021) defines as “behaviour that leads to the qualitative reduction of production and consumption” (p. 1274). Vallastaden introduced shared spaces, including guest apartments, communal kitchens, and recreational areas, reducing the need for private floor space and lowering per capita energy consumption. However, explicit policies to promote sufficiency remain limited. Papers 1 and 3 found that planning instruments such as detailed development plans could be used more effectively to support solar

optimisation and integration at the neighbourhood or district scale, as was also shown in previous research (Kanters & Wall, 2018). Without such broader integration, energy efficiency, renewable energy generation, storage and flexibility, and sufficiency remain limited.

CHAPTER 7

Conclusions

This final chapter synthesises the contributions of the thesis and reflects on the implications for studying and implementing sustainable urban development and energy policies. I revisit the research questions and highlight the theoretical and methodological insights generated across the four papers. The chapter also considers the practical implications for policy and planning and concludes by outlining directions for future research.

7.1 Revisiting the research questions

The following sections revisit the research questions and explain how the findings of the thesis have addressed them.

RQ1: How do the roles and responsibilities of local governments and developers influence the implementation of energy policies in Swedish sustainable urban development projects?

In Swedish sustainable urban development projects, the roles and responsibilities of local governments and developers significantly influence the implementation of energy policies. Local governments typically initiate and lead these projects, but they often face challenges in the later phases due to their dual role as planning authorities and landowners. The Swedish National Board of Housing, Building, and Planning (Boverket) oversees compliance with national energy policies, such as the EPC, while MEPRs are reviewed by local governments during the building permit phase. This often leads to a design for compliance approach, where energy requirements are met only during the design phase without post-construction performance monitoring. The findings show that developers are more likely to implement energy policies when these align with their business models, particularly among those who build to own rather than to sell. Regulatory frameworks and negotiated requirements through land allocation processes also influence

developers. However, these mechanisms tend to be more effective during periods of economic growth and in attractive land markets. The case studies reveal limited consequences for failing to meet negotiated energy goals or requirements.

The thesis identifies a recurring pattern of *organised irresponsibility* (Haderer, 2023; Torrens & von Wirth, 2021), where multiple actors share responsibility, but accountability remains diffuse. Fragmentation of responsibilities between local governments, developers, and national authorities, combined with weak enforcement and limited coordination, leads to frequent underperformance in meeting energy requirements, as demonstrated in the energy data analysis. To address this, stronger institutional frameworks are needed to clarify roles, enhance accountability, and embed mechanisms for reflexive learning throughout planning and implementation for all actors involved.

RQ2: How are energy policies implemented through governance arrangements in Swedish sustainable urban development projects?

The case studies show that energy policies are primarily implemented through two key governance arrangements: project-specific sustainability visions and goals and land allocation processes. These arrangements operate within an institutional context shaped by the 2015 legal reform, which restricts local governments from imposing sustainability requirements beyond national standards. As a result, more informal governance arrangements are often used to incorporate energy policies into urban development projects, supplementing the limited scope of formal planning instruments. Project-specific sustainability visions and goals for the urban development project help to align actors, shape shared understandings and guide the planning process. The cases of Kvillebäcken, Vallastaden, and Brunnshög illustrate how energy policies are embedded in quality or sustainability programmes and collaboration contracts. However, these often lack contractual anchoring and follow-up mechanisms. Over time, the implementation of initial sustainability goals and ambitions often weakens. Through the second governance arrangement, land allocation processes, local governments exercise influence over developers by demanding or negotiating the implementation of energy policies in building projects. Local governments experiment with different planning instruments, including sustainability contracts and competition formats. However, tensions arise between the local governments' desire for control and developers' preference for flexibility, which can complicate enforcement and consistency. As the urban development projects move toward implementation, the effectiveness of both governance

arrangements often diminishes. Follow-up instruments, such as monitoring, evaluation, or binding enforcement, are usually weak or absent, hindering the implementation of energy policies. Formal planning instruments, like detailed development plans, building permit controls and EPCs, remain underutilised, making it difficult to ensure long-term compliance or assess energy outcomes. The reliance on voluntary commitments and insufficient follow-up contributes to an implementation gap between initial ambitions and the outcomes. The thesis highlights that balancing concrete and enforceable goals with flexibility for adaptation, supported by instruments such as building certification systems and accountability frameworks, can enhance the implementation of energy policies, improving both legitimacy and effectiveness in practice.

RQ3: How can institutional capacity building be strengthened to improve the implementation of sustainable urban development projects?

This thesis found that institutional capacity should not be viewed as a one-time effort at the initiation or early phases of urban development projects, but rather as a long-term and iterative process that evolves alongside changing conditions. To help close the implementation gap, urban development projects must be more effectively integrated into formal institutional structures that support institutional capacity building over time. The three cases examined in this thesis highlight how local governments use experimentation to build institutional capacity and respond to uncertainties such as regulatory changes, economic shifts, and evolving sustainability ambitions. While experimental governance offers flexibility and adaptability, without formal feedback loops, institutional integration, and learning mechanisms, experimental practices risk becoming fragmented and ad hoc. In some instances, experimentation functions as a compensatory strategy, enabling local governments to deal with legal and institutional constraints, leading to a focus on short-term outcomes without fundamentally transforming governance structures. For experimentation to contribute to institutional capacity building, it must be embedded within formal governance frameworks, underpinned by clear regulations and mechanisms for continuous learning and adaptation. Strengthening institutional capacity also requires more rigorous follow-up, monitoring, and evaluation of sustainability objectives at the district and project levels to ensure accountability and measurable progress toward the sustainability goals.

7.2 Theoretical contributions

This thesis offers new insights into institutional capacity building in urban planning through a longitudinal and empirically grounded analysis. By linking institutional capacity building to concrete urban development outcomes over time, the thesis moves beyond prior research that focused on the early stages of planning or treated institutional capacity more as a static potential. It shows that institutional capacity is a continuous process shaped by changing priorities, actor constellations, and institutional conditions. In line with Healey (2004) and Hodson et al. (2018), the results highlight how ongoing, iterative interactions between experimental initiatives and broader institutional structures play a crucial role in building and strengthening institutional capacity. The dynamic view of institutional capacity building adds complexity to existing conceptualisations and underscores the need for long-term coordination, learning, and follow-up throughout the design, implementation, and use. The analytical framework presented in Paper 4 offers a starting point to be used in other contexts.

The thesis also contributes through a longitudinal application of the middle-out perspective, which has rarely been used in this way (Janda et al., 2019). This perspective is particularly well-suited to studying the agency and capacity of middle-actors, in this case, developers, who operate between top-down policy frameworks and bottom-up implementation challenges. It offers a more situated and relational account of how institutional capacity emerges and evolves.

7.3 Methodological contributions

This thesis makes several methodological contributions that can offer valuable insights for researchers and practitioners in other (national) contexts. First, adopting a longitudinal approach to studying institutional capacity building in sustainable urban development projects highlights the importance of viewing urban planning processes as dynamic and evolving. Rather than capturing a static moment or a specific phase, this perspective enables a deeper understanding of how governance arrangements, roles and responsibilities, and policy implementation shift in response to changing conditions. Second, integrating energy data with interviews and planning document analysis provides a more holistic and triangulated view of energy policy implementation (Lowe et al., 2018). Combining these methods enhances the depth of the research findings by capturing the

processes and the outcomes. With an increased data quality of EPCs, this integrated approach offers a replicable method for assessing energy policy effectiveness. Third, the thesis employs a multi-level perspective on energy policy implementation, bridging local, national, and EU governance layers. This methodological orientation allows for a richer analysis of how policies are shaped, negotiated, and enacted across different scales, as was also shown by Smedby (2020).

7.4 Implications for policy and practice

This thesis provides several policy and practical recommendations for improving the implementation of sustainable urban development, with a focus on energy policies. While grounded in the Swedish context, the findings have broader relevance for the EPBD and international settings with similar governance and planning systems. In particular, countries like China, Singapore, Finland, and the Netherlands, where land allocation is key in steering urban development, may find these insights applicable (Caesar, 2016; Singhapathirana et al., 2022; Valtonen & Falkenbach, 2025).

EPBD

Four key recommendations for improving the implementation of the EPBD have been formulated. First, verifying compliance with MEPRs should go beyond calculated energy performance and incorporate measured data from EPCs based on measured energy use or high-resolution metering to enable more accurate assessments and policy learning. Second, responsibilities across governance levels need to be more clearly defined: while MEPRs and EPCs are set and managed nationally, enforcement often occurs locally. National EPBD implementation could clarify roles and connect responsibilities to existing inspections or audit procedures. Third, the EPBD should emphasise operational energy performance more by extending accountability to building owners, landlords, and developers and supporting feedback loops between design, construction, and use. Finally, the accuracy and consistency of EPCs need to be improved through standardised, measurement-based methodologies and the certification of qualified experts, ensuring EPC data can be reliably used for compliance, evaluation, and user engagement.

National level

Since the 2015 legal reform, local governments have had limited capacity to impose stricter technical (sustainability) requirements through formal planning tools. This shift frames sustainability as a maximum regulation

rather than a minimum benchmark, which risks undermining local ambition and innovation, an issue also observed in the UK context, where national policy changes also limited local governments' ability to exceed central standards (Peacock & Allmendinger, 2021). Smedy (2020) argues that while proactive local governance may sometimes result in temporary disturbances, such initiatives often spark public debate and highlight policy alternatives. Rather than limiting local requirements, a more harmonised coexistence of governance levels could contribute to more legitimate processes for sustainable urban development. This is particularly important as the focus increasingly shifts from new developments toward transforming the existing built environment, which inherently demands greater local flexibility and adaptive governance.

To support the effective implementation of sustainability goals in urban development, national legislation need to provide more explicit legal guidance on the use of land allocation processes as a tool for including sustainability requirements in land allocation contracts. Current legal ambiguities surrounding the authority of local governments to negotiate, impose or enforce such requirements through land allocation agreements create uncertainty for both local governments and developers, weakening long-term accountability and follow-up. National policy should either explicitly define the legal boundaries of this practice or establish formal regulations that enable local governments to set and monitor sustainability requirements linked to the transfer of publicly owned land, as was also suggested by Candel (2022). Clarifying these frameworks would strengthen the legal foundation for sustainable urban development and enhance the capacity and legitimacy of local governments to implement sustainability requirements.

The Swedish National Board of Housing, Building, and Planning (Boverket) plays a leading role in coordinating the implementation of MEPRs and EPC policies. To improve the effectiveness of energy policy delivery, the Swedish National Board of Housing, Building, and Planning (Boverket) needs to take the lead in clarifying the division of responsibilities between national and local levels, particularly by aligning national MEPR standards with verification procedures at the local government level. This could include incorporating EPCs into the final inspection phase of the building permit process and establishing mechanisms for post-construction monitoring to ensure energy performance aligns with design expectations. In line with proposals by Wahlström et al. (2020), energy performance should be verified

not only at the design stage but also through measured energy use two years after occupancy, with clear consequences for non-compliance, such as conditional fines issued by the Swedish National Board of Housing, Building, and Planning (Boverket). This integrated approach would create stronger accountability and improve energy outcomes.

Local level

Local governments could strengthen their role in sustainable urban development by using formal planning instruments more effectively, such as detailed development plans, building permit controls, and EPCs. These tools are underutilised, limiting the ability to ensure implementation of sustainability goals and assessing energy performance. Detailed development plans could be used strategically to support solar optimisation and renewable energy integration at the district scale (Kanters & Wall, 2018). Or as in Vallastaden, where building heights were deliberately left open in the detailed development plan, enabling design flexibility for the use of timber structures. MEPR compliance could be linked to mandatory building inspections, using EPCs based on measured energy use, with clear consequences for non-compliance to strengthen enforcement of energy policies.

Local governments should aim to balance project-specific sustainability visions and goals for urban development with flexible implementation strategies that allow adaptation to changing conditions while maintaining policy coherence, legitimacy, and accountability. Even without fully clarified national legal guidance, local governments can take a proactive role in land allocation processes by negotiating sustainability commitments with developers, embedding clear criteria into land allocation agreements and establishing follow-up mechanisms. Local governments could promote recognised environmental certifications as flexible and outcome-oriented planning instruments. Such certifications include high sustainability standards and reduce administrative work at the local government level by linking environmental goals to market incentives and industry norms.

Experimentation, such as iterative land allocation approaches, already contributes to learning, but it is often ad hoc and poorly embedded in planning routines. Local governments need to establish ongoing feedback loops that connect early visions and goals with later implementation and focus on learning from setbacks and using outcomes to reassess and refine approaches for achieving objectives (Fitzgerald & Lenhart, 2016). It is also important to

capture process learning - how governance practices, organisational routines, and actor interactions change through experimentation (Evans et al., 2021). This includes documenting successes and failures, sharing lessons across projects and cities, and combining quantitative energy data with qualitative insights from actors. Local governments can improve their capacity to meet sustainability goals by systematically integrating experimentation, reflection, and monitoring.

Finally, local governments could make more active use of their public housing companies, particularly in situations where weak market demand limits the interest of private developers in implementing sustainability goals and ambitions. Public housing companies can also be instrumental in pushing the sector forward and enabling local governments to take an active role as change agents in driving sustainability.

7.5 Future directions

This thesis advances understanding of institutional capacity building in Swedish sustainable urban development projects, examining three different cases through the implementation of energy policies. Building on the findings and limitations of this thesis, this section outlines suggestions for future research.

While this thesis takes a longitudinal approach to studying planning for sustainable urban development and institutional capacity building, future research could further extend these timeframes and incorporate action research methods. Such methods enable researchers to engage actively with ongoing sustainable urban development processes, moving beyond observation to influencing initiatives. This approach could generate more profound, practical insights into how governance arrangements and roles and responsibilities evolve, particularly in learning and capacity building. Additionally, as Witzell & Oldbury (2023) highlight, there is an ongoing need for both researchers and public planning agencies to safeguard democratic legitimacy and prioritise limited planning resources.

Future research should explore institutional capacity building in smaller Swedish local governments and in less attractive or more mundane development contexts, as was also highlighted in previous studies (Brokking et al., 2020; Isaksson & Hagbert, 2020; Kronvall et al., 2024; Witzell & Oldbury, 2023). These contexts often operate under conditions different

from those of the larger local governments examined in this thesis. Gaining insight into how institutional capacity develops in such settings can help tailor strategies for sustainable urban development across a broader range of local governments.

There is also a need to broaden the scope of actors examined in sustainable urban development processes. While this thesis focuses primarily on the local government–developer relationship, other actors, including LECs, consultants, architects, contractors, and energy companies, play crucial roles in sustainable urban development projects. As Paper 1 illustrates, these actors contribute diverse expertise and values, while Paper 2 highlights the importance of property owners and landlords in ongoing energy management. Future research should account for these multiple perspectives to capture the full complexity of actors involved in the governance arrangements and their interactions. Another direction for future research lies in examining private sector-led sustainable urban development. As demonstrated in Paper 3 through one of the Norwegian cases, the dynamics and outcomes of projects led by private actors may differ significantly from those initiated by local governments. Future studies could investigate what motivates private developers to pursue sustainability goals, how they interact with regulatory frameworks, and what governance arrangements facilitate or hinder their efforts. The development of Råängen by the Church of Sweden could be an example (Pelzer et al., 2021).

This thesis has touched upon the legal grey zones surrounding land allocation processes, particularly when local governments use them to enforce sustainability requirements. However, it does not further explore the legal implications of these practices. Future research should investigate the legal foundations, limitations, and enforcement mechanisms associated with land allocation, especially concerning private contract rights, land allocation legislation, and the Planning and Building Act. This could help clarify the extent to which local governments can legally impose and enforce sustainability requirements through land allocation agreements.

Exploring the international influence of Swedish sustainable urban development practices also presents future research opportunities. For instance, using Vallastaden as a reference for the Kop Boulevard project in Enschede (the Netherlands) suggests that Swedish approaches are being adapted elsewhere. Further studies could examine how such models are interpreted, translated, and transformed across borders, shedding light on

the transnational dynamics of urban sustainability discourse and practice. In line with this, it would be worthwhile to investigate the role of Swedish urban planning and housing exhibitions in advancing sustainable urban development. These exhibitions, which often serve as high-profile showcases for innovation, may also function as institutional platforms that shape policy agendas, attract actors, and support experimentation. Understanding their long-term influence could offer insights into how symbolic, cultural, and institutional mechanisms intersect in urban governance.

A key reflection from this research, expressed by a local government representative from Brunnshög (2024), is the contradiction in achieving sustainability through new construction: “If we want to meet sustainability goals, we probably should not be building anything”. This statement illustrates a growing concern in urban planning: that building more, even if it is labelled sustainable, may not be the right way forward. In recent years, growth-oriented assumptions in urban planning have increasingly been discussed (Durrant et al., 2023; Krähmer, 2021; Lamker & Terfrüchte, 2024; Næss, 2023; Rydin, 2025). Durrant et al. (2023, p. 290) argue that we must “delink planning policy and practice from the reliance on growth and ever-continuing new urban development to achieve public goals”. Næss (2023) argues that we need to reduce the total building space per person and share floor and urban space more fairly (Næss, 2023). As this thesis shows, sustainability efforts often focus on how we build, but we also need to ask whether we should build at all. Urban planning should prioritise reusing the existing built environment, supporting sufficiency, and ensuring that any new development stays within environmental limits. Therefore, I believe it is crucial to broaden urban planning research to address the transformation of the existing built environment and to incorporate perspectives on planning without growth.

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