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Local Environmental Governance

Assessing proactive initiatives in building energy efficiency

NORA SMEDBY | IIIEE | LUND UNIVERSITY

Local Environmental Governance

Assessing proactive initiatives in building energy efficiency

Nora Smedby

LUND UNIVERSITY

DOCTORAL DISSERTATION
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Local environmental governance: Assessing proactive initiatives in building energy efficiency

Abstract

Local governments are increasingly taking the initiative in environmental governance. But can they make any difference in addressing current environmental challenges, which are becoming more and more global in scope? This PhD thesis explores and analyses the outcomes of proactive initiatives in the field of building energy efficiency, and the governance approaches taken. It addresses outcomes both in the socio-technical system that constitutes the building, and in the institutional sphere. The overarching objective is to contribute to knowledge on the role of local initiatives in addressing current environmental challenges.

The thesis focuses on a number of governance initiatives in the form of policies or strategic approaches in urban development projects in Sweden, and one in Denmark. The primary focus has been on proactive initiatives for enhancing the energy efficiency of new buildings. Through a case study approach, the research is based on a combination of methods for data collection, including document studies, interviews and participant observation to analyse the governance approaches in local governance initiatives and the different types of outcomes.

A key finding is that the local governance initiatives investigated have played a role in environmental governance through outcomes across socio-technical systems and institutional spheres. The combination of different modes of governing, including authoritative and enabling modes of governing as well as governing by provision, was important for fostering the construction of more energy efficient buildings. Another important element in these governing processes was the active governing throughout the development process. In terms of institutional change, it was shown that relation-building and knowledge advancement were fostered successfully, while it was more difficult to actually mobilise for change. The research also showed how local initiatives are shaped by institutions at higher tiers of government and that the local initiatives also contributed to shaping institutions at the national level. Based on this, the thesis argues for national policy frameworks, which better capture the benefits of local frontrunners.

Key words local governance, policy evaluation, building energy efficiency, sustainability transitions, polycentric governance

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Local Environmental Governance

Assessing proactive initiatives in building energy efficiency

Nora Smedby

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Till Maud, Lars, Barbro & Björn

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I am also very grateful for the academic outlooks provided by the colleagues in the research collaborations which I have been part of throughout this thesis journey, in the research projects LETS 2050 and Urban Transition Öresund as well as with the Center for Design, Innovation and Sustainable Transition at Aalborg University, Copenhagen. Thank you in particular Maj-Britt Quitzau who generously welcomed me for a research exchange at this centre.

My colleagues at the IIIEE, and in particular the PhD group, form a research environment in which I have felt at home and confident to critically and passionately engage in our joint ambition to develop knowledge for environmental sustainability. This has meant a lot to me. A particular thanks goes to the guest professors who all, in different ways, supported me in my research education, to Peter Hennicke for being an inspiration for how researchers can engage societally in order to make change, to James Evans for discussing a draft of this thesis, and to Eva Heiskanen for her humble yet world class engagement in catalysing the intellectual exchange within the PhD group. Eva, you are an academic role model! My office mates Jonas, Olga and Yuliya, thank you for not only putting up with me, but providing a highly valued support through the ups and downs of this journey. And Berni, my mentor in everything, thanks!

Thank you also to my supervisors, Lena Neij and Kes McCormick. Kes, thanks for always being prepared to contribute with valuable fresh views on my work and for reminding me to not make things too complicated. Lena, thanks to you, I embarked on this PhD project. Your strong encouragement and support throughout the PhD project has made it into a surprisingly smooth journey. Thank you!

Lastly, I would like to thank my family and friends. You know who you are and I am so grateful for having you in my life. Thank you for challenging, yet always supporting me, for all the laughter and for just being there.

The thesis is dedicated to my four grandparents, Maud, Lars, Barbro and Björn. I have had the privilege to develop close relationships to all of them. They have inspired me both personally and as a researcher in different ways. Maud you showed me the importance of listening and building trust. The love of cities that you conveyed, was also with me in writing this thesis. Lars you remind me to be curious and to appreciate the small marvels of life. You also inspire me to make use of language as a creative driving force. Barbro, you are a source of inspiration in your commitment to, and passion for, making the world a better place. You also make me see the wondrous beauty of the world, which is a great source of energy and inspiration for me. And Björn, if I can just have a little bit of your warm-hearted wisdom, I will be grateful.

Nora

Lund, February 2016

Abstract

Local governments are increasingly taking the initiative in environmental governance. But can they make any difference in addressing current environmental challenges, which are becoming more and more global in scope? This PhD thesis explores and analyses the outcomes of proactive initiatives in the field of building energy efficiency, and the governance approaches taken. It addresses outcomes both in the socio-technical system that constitutes the building, and in the institutional sphere. The overarching objective is to contribute to knowledge on the role of local initiatives in addressing current environmental challenges.

The thesis focuses on a number of governance initiatives in the form of policies or strategic approaches in urban development projects in Sweden, and one in Denmark. The primary focus has been on proactive initiatives for enhancing the energy efficiency of new buildings. Through a case study approach, the research is based on a combination of methods for data collection, including document studies, interviews and participant observation to analyse the governance approaches in local governance initiatives and the different types of outcomes.

A key finding is that the local governance initiatives investigated have played a role in environmental governance through outcomes across socio-technical systems and institutional spheres. The combination of different modes of governing, including authoritative and enabling modes of governing as well as governing by provision, was important for fostering the construction of more energy efficient buildings. Another important element in these governing processes was the active governing throughout the development process. In terms of institutional change, it was shown that relation-building and knowledge advancement were fostered successfully, while it was more difficult to actually mobilise for change. The research also showed how local initiatives are shaped by institutions at higher tiers of government and that the local initiatives also contributed to shaping institutions at the national level. Based on this, the thesis argues for national policy frameworks, which better capture the benefits of local frontrunners.

Populärvetenskaplig sammanfattning

Städer har kommit att framstå som alltmer drivande i arbetet med att ställa om till ett ekologiskt hållbart samhälle. Utöver att genomföra statliga direktiv eller fokusera på klassiskt kommunala uppgifter som fysisk planering eller renhållning, har kommunala politiker och tjänstemän alltmer kommit att driva en egen miljöpolitik på lokal nivå. Ett exempel är energi- och klimatområdet, där kommuner ofta sätter upp högre mål kring minskningar av växthusgasutsläpp och omställning av energisystemet än vad som görs på nationell nivå.

Men kan en enskild kommuns ansträngningar göra någon skillnad när det gäller att lösa de brådskande globala miljöutmaningarna? Den här avhandlingen syftar till att ta reda på just detta. Resultaten tyder på att kommunerna kan göra skillnad.

En viktig aspekt är att undersöka i vilken utsträckning dessa typer av proaktiva kommunala insatser faktiskt genomförs och huruvida de bidrar till att nå uppsatta mål. Andra relevanta aspekter att undersöka är huruvida initiativen bidrar till tillämpning av ny teknik och om de kan leda till förändringar relaterade till förutsättningarna för politisk styrning. Sådana förändringar kan till exempel vara om initiativen påverkar samspelet mellan olika aktörer i planeringsprocessen, eller om lokala initiativ sätter press på nationell lagstiftning. Alla dessa typer av effekter har undersökts som del av denna avhandling. Forskningen har också undersökt vilka former kommunernas strategiska arbete tar, genom att studera hur regler, dialog och tillhandahållande av infrastruktur används av kommunerna för att uppnå förändring. Kunskap på detta område behövs för att kunna utforma bättre politiska styrmedel på lokal nivå och bättre övergripande politiska ramar för omställningen till ett långsiktigt hållbart samhälle.

Den här avhandlingen fokuserar till stor del på initiativ för att främja byggandet av energieffektiva byggnader i svenska kommuner. Med energieffektiva byggnader menas byggnader som använder mindre energi för byggnadens drift och uppvärmning än konventionella byggnader. Byggnader står för över en tredjedel av den slutliga energianvändningen i Sverige och Europa. Att minska energianvändningen genom olika energieffektiviseringsåtgärder i nya och befintliga byggnader framhålls ofta som det allra mest kostnadseffektiva sättet att minska växthusgasutsläpp. Många

investeringar är mycket billiga eller lönar sig till och med för den som gör investeringen[1].

I Sverige värms byggnader till stor del med förnybara energikällor och kärnkraft, som inte orsakar några betydande utsläpp av koldioxid. Att minska slöseriet med energi i byggnader är ändå viktigt för att ställa om till ett kolsnålt samhälle, eftersom ett sådant samhälle kräver att den kolsnåla energin används där den kommer bäst till nytta. Men energianvändningen i byggnader är också kopplat till en mängd andra hållbarhetsutmaningar från global till lokal nivå, såsom miljöpåverkan av kärnkraft och förnybar energiproduktion, resursbrist[2], energifattigdom, och energisäkerhet. Dessa är några av anledningarna till att energieffektiva byggnader är en gemensam angelägenhet som staten på såväl lokal som nationell och EU-nivå vill främja.

För att undersöka om och hur kommunala initiativ bidrar till omställning till ett hållbart samhälle har jag undersökt kommunala politiska styrmedel samt strategiska tillvägagångssätt i enskilda stadsutvecklingsprojekt. Dessa två olika typer av lokal politisk styrning refererar jag till med det gemensamma begreppet styrningsinitiativ (governance initiatives). Det som är gemensamt för de studerade styrningsinitiativen är att de utgör strategiska insatser av kommunen som syftar till att ”gå före”. Det handlar alltså om initiativ där kommunen vill uppmuntra lösningar som är mer ambitiösa än vad som till exempel krävs i nationella regler, och på så sätt driva på utvecklingen i en ekologiskt hållbar riktning.

Forskningen är baserad på analys av policydokument och byggnadsdokumentation, litteratur, intervjuer med byggherrar och kommunala tjänstemän samt observationer vid olika typer av möten.

Jag har studerat ett antal olika initiativ i flera svenska kommuner och en dansk. En kommun som förekommer i alla artiklar är Malmö. I Malmö har en serie initiativ gjorts efter varandra, där tidigare erfarenheter bidragit till att forma senare initiativ. Malmö är därför en intressant kommun att studera i sin roll som föregångare.

I sina försök att främja energieffektivt byggande har de studerade kommunerna använt sig av olika former av dialog med byggherrar, men också bindande regler, såsom energikrav. Kommuner saknar befogenhet att sätta sådana tekniska egenskapskrav på byggnader. Därför har många kommit att använda sitt markinnehav för att ställa krav genom civilrättsliga avtal i samband med markförsäljningar. Valet

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[1] Det finns emellertid en debatt kring hur stor lönsamheten är på energieffektiviseringsåtgärder. Åsiktsskiljaktigheter beror bland annat på hur(uvida) hänsyn tas till olika tidskostnader och olika osäkerheter i lönsamhetsbedömningarna.

[2] Avfall är en viktig energikälla i Sverige. Ett resurssnålt samhälle kräver att vi istället förebygger avfallsproduktion.

att förse ett område med fjärrvärme och uppmuntra byggherrar att ansluta till denna (eller inte) har också varit viktigt för att forma de nya byggnadernas energisystem.

Resultaten från forskningen visar att en kombination av dialog och bindande regler har varit framgångsrik för få byggherrar att höja sina ambitioner vad gäller byggnadernas energiprestanda. När kommunen enbart använde sig av dialog så tenderade miljöfrågorna att falla bort under processens gång eller så nåddes inte överenskomna mål. När kommunen enbart förlitade sig på bindande krav så hade dessa effekt på byggnadernas energiprestanda. Men byggherrarna tenderade då att lägga sig på lägsta möjliga ambitionsnivå givet kraven. De mer radikala lösningarna kräver ofta stora anpassningar av byggprocessen och är därför svåra att få till skott. Dialog var viktigt för att skapa acceptans för höga hållbarhetsambitioner samt för att stödja den lärandeprocess som anammande av nya tekniska lösningar innebär. På så sätt kunde införandet av radikalt bättre lösningar främjas, även om de fortfarande inte infördes på bred front i de studerade utvecklingsprojekten.

Resultaten visar också att det är viktigt att från kommunens sida arbeta med hållbarhetsfrågorna genom hela stadsutvecklingsprocessen. Det handlade, i de studerade projekten, om att ha en dialog med byggherrarna och motivera dem när svårigheter uppstod eller att då omförhandla överenskommelser och hitta nya lösningar. Men det handlade också om att kontrollera att krav och överenskommelser som gjorts faktiskt efterlevdes. Forskningen visar både på exempel när detta fungerade väl och när det fungerade mindre väl.

De studerade initiativen för energieffektivt byggande har också väckt kritik från nationella politiker och delar av byggindustrin, särskilt de bindande kraven. En källa till kritik har varit att de bidrar till kostnader och merarbete när de skiljer sig från nationella regler. I de intervjuer som gjordes inom avhandlingen bedömdes merkostnaderna som små av byggherrarna. Ett sätt att ytterligare öka acceptansen för lokala överenskommelser och krav är att använda sig av liknande begrepp och standarder som används i nationell lagstiftning, eller i byggherrarnas eget hållbarhetsarbete. När de kommunala kraven skiljde sig mycket från industrins egna standarder, så ledde det ibland till att byggherrar sänkte ambitionsnivån i de lokala projekten, eller att de inte följde gjorda överenskommelser.

Inom ramen för avhandlingen studerades också samspelet mellan olika statliga nivåer (kommunal, nationell och EU-nivå). De kommunala initiativen för energieffektiva byggnader har både påverkats av och påverkat regelverk på nationell och EU-nivå. Ibland ledde samspelet mellan de olika nivåerna till synergier, till exempel, då erfarenheter från lokala initiativ kunde användas när nationella byggregler skulle uppdateras. Men de lokala initiativen ledde också till konflikter. Detta ledde till införandet av en lag med syftet att begränsa kommuners möjlighet att använda sitt

markägande för att ställa krav på byggnaders tekniska egenskaper[3]. Utifrån resultaten argumenterar avhandlingen för nationella politiska ramverk som bättre kan tillvarata fördelarna med föregångare på lokal nivå, till exempel genom framåtsyftande energikrav i de nationella byggreglerna, där enskilda kommuner kan få införa de framtida kraven i förtid.

[3] Lagens slutgiltiga formulering var tvetydig och olika tolkningar har gjorts av huruvida den faktiskt omöjliggör kommunala krav i markanvisningsavtal. Det återstår att se hur lagen kommer att tillämpas.

Popular science summary

Cities appear to drive the environmental sustainability agenda to an increasing extent. While local environmental governance has traditionally been about implementing higher level policies, or carrying out municipal tasks such as spatial planning or the provision of municipal services, local politicians and civil servants are increasingly pushing environmental agendas. One example is in the climate and energy area, where local governments often set higher targets regarding greenhouse gas emission reductions, and transformation of the energy system, than at the national level. But can the initiatives of cities make any difference when it comes to solving the urgent global environmental challenges? This thesis aims to investigate this. The results suggest that those initiatives can make an important difference.

A key aspect to investigate is the extent to which these types of proactive local governance initiatives are actually carried out, and their effect. Other relevant aspects are whether and how the initiatives contribute to the spread of new technologies and whether they bring about changes related to the conditions for governing. Examples of such changes include the influence of the initiatives on the interplay between different actors in the urban development process, and pressure of local initiatives on national regulation. The research also investigated how this local strategic work is carried out. This was done by looking at how, for example, binding requirements, dialogue and the provision of certain infrastructures were used in order to bring about change. Knowledge in these areas is important for developing better governance at the local level, as well as better overarching governance frameworks for fostering environmental sustainability.

The thesis focuses to a large extent on initiatives for enhancing the energy efficiency of new buildings within Swedish municipalities. An energy efficient building is a structure that uses less energy than conventional buildings for its operation and heating. Buildings stand for more than a third of the final energy use in Sweden and Europe. Decreasing this energy use through different energy efficiency measures in new and existing buildings is often highlighted as the most cost-effective measure for

decreasing greenhouse gas emissions; often, the investments are very cheap or even pay off for the person making the investment[4].

Swedish buildings are to a large extent heated by renewable energy and nuclear power, neither of which contributes significantly to greenhouse gas emissions. However, increasing energy efficiency is still important for enabling the transition to a low-carbon society, as it requires the use of low carbon energy where it is most needed. But building energy use is also associated with a number of other sustainability challenges, operating at different levels, from the local to the global. These include environmental impacts stemming from renewable and nuclear energy production, resource scarcity[5], energy poverty and energy security. These are some of the reasons for building energy efficiency being a societal concern, and for governments, at local as well as national and EU levels, wanting to promote it.

In order to investigate whether local governance initiatives contribute to fostering environmental sustainability, this research explores such initiatives both in the form of local public policies, and in the form of strategic approaches in specific urban development projects. All the initiatives studied constitute examples of proactive initiatives. In other words, it is a question of municipalities wanting to encourage solutions that are more ambitious than required, for instance, by national governments, thereby serving as a driving force for environmental sustainability.

The research is based on the analysis of policy documents and building documentation, literature, interviews with building developers and municipal staff, as well as observations made during meetings. The research focused on a number of initiatives in several Swedish municipalities and one Danish example. A municipality that appears in all articles is Malmö. There, a series of governance initiatives have been introduced, building on experiences from previous initiatives. Malmö is an interesting municipality to study in its role as a forerunner.

In their ambition to foster energy efficient buildings, the municipalities have used different types of dialogue with building developers, but also binding requirements, such as energy performance requirements. Swedish municipalities do not have the authority to regulate the technical properties of buildings. Many municipalities have therefore used their land ownership in order to set binding requirements through civil agreements associated with the sale or lease of municipally owned land. The choice to

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[4] There is, however, a debate regarding the cost-effectiveness of energy efficiency investments. Lines of disagreement relate to whether and how non-monetary costs, such as time use, as well as uncertainties, are included in the analysis.

[5] Waste incineration, for example, is an important source of energy in Sweden. In a resource efficient society, such waste should instead be prevented.

provide an area with district heating and encourage developers to connect to it (or not) has also been important in shaping the energy systems of new buildings.

The research results show that a combination of dialogue and binding requirements was successful in making building developers raise their ambitions in terms of energy performance. When municipalities only used dialogue, environmental aspects tended to be lost in the urban development process, or the agreed targets were not met. When, on the other hand, a municipality turned to binding requirements only, this influenced building energy performance. However, the results also showed that developers then adopted the lowest possible ambition level, given the requirements. The more radical solutions often require alterations in various aspects of the construction process, and they are therefore difficult to bring about. Dialogue was important for creating acceptance for high sustainability ambitions, and for supporting the learning process, which is associated with the adoption of new technologies. Through a combination of dialogue and requirements, building developers could be pushed to engage with more radical solutions for building energy efficiency. They were, however, still not exceptionally radical.

The results also show that, in order to keep the environmental issues on the agenda, it was important for the municipality to govern actively throughout the entire urban development process. This could involve having a dialogue with building developers and motivating them when challenges occur, or renegotiating agreements when difficulties arise in achieving agreed targets. But it could also involve controlling and ensuring that agreements and binding requirements are actually adhered to. The research found examples of this working well, and also of not working well.

The initiatives for building energy efficiency that have been researched have also rendered critique from national politicians and the building industry, in particular the binding requirements. One reason for critique has been that the requirements contribute to costs and extra work when they differ from national regulations. In interviews with building developers in Malmö, the additional construction costs were, to a great extent, assessed as being small. One way to further increase the acceptance of local agreements and requirements is to use concepts and standards similar to those in national regulations, or to those in the building developers' sustainability work. When local requirements differed markedly from the building developer's standards, this sometimes led to building developers lowering their ambitions in terms of energy performance in the projects, or to them not adhering to agreed targets.

The research also addressed the interaction between different levels of government (municipal, national and the EU). The local governance initiatives for building energy efficiency have been shaped by, and have also shaped, regulation at the national level and EU level. Sometimes, the interplay led to synergies, such as when experiences from municipal initiatives were included in the revision of the national building code. However, the local initiatives also led to conflicts. This resulted in the introduction of a law that aimed to limit the possibility of municipalities using their land ownership

to set technical requirements on buildings[6]. Based on the results, the thesis argues for national policy frameworks, which better capture the benefits of local frontrunners. Such frameworks could, for example, be the inclusion of forward-looking requirements in the national building code, and allow municipalities already now to apply the future requirements.

[6] The final wording of the law is ambiguous and it remains to be seen whether, on being applied, it means a ban on municipalities' possibility to set technical requirements on buildings when selling or leasing land.

List of papers

I

Smedby, N., & Neij, L. (2013). Experiences in urban governance for sustainability: The Constructive Dialogue in Swedish municipalities. *Journal of Cleaner Production, 50*(1), 148-158. doi:10.1016/j.jclepro.2012.11.044

The paper was written together with Lena Neij, who is also the main supervisor of the PhD project. My role was to collect the data, develop the analytical framework, analyse the data and write the text in close dialogue with the co-author.

II

Smedby, N. (2016) Assessing local governance experiments for building energy efficiency – the case of Malmö, Sweden. *Environment and Planning C: Government and Policy*. *36*, 299-319. doi:10.1177/0263774X15614176

III

Smedby, N., & Quitzau, M.-B. Municipal governance and sustainability: The role of local governments in promoting transitions. *Environmental Policy and Governance*. (Accepted)

The paper was written together with Maj-Britt Quitzau, Aalborg University. The analytical framework was developed jointly. I collected the data for the Swedish case. Both authors were involved in analysing the data and writing. I did the final editing of the paper.

IV

Smedby, N. Local environmental governance and institutional change: Multilevel governance and building energy efficiency in Sweden. (Submitted)

Other publications not included in the thesis

Smedby, N. (2011). *Policy development in a non-OECD context: Energy efficiency policy for Argentine buildings*. Paper presented at the eceee 2011 Summer Study: Energy efficiency first: The foundation of a low-carbon society, Belambra Presqu'île de Giens, France.

Nilsson, L. J., Khan, J., Andersson, F. N., Klintman, M., Hildingsson, R., Kronsell, A., Pettersson, F., Pålsson, H. & Smedby, N. (2013). I ljuset av framtiden: Styrning mot nollutsläpp 2050 [In the Light of the Future: Governing towards zero emissions 2050]. Lund, Sweden: Lund University.

Smedby, N., Strand, M., & Neij, L. (2013). The Western Harbour: A pioneer in sustainable building dialogue. In B. Persson (Ed.), *The Western Harbour: Experiences and lessons learned Malmö, Sweden* (pp. 96-97). Malmö, Sweden: Arkus.

Mundaca, L., Na, L., & Smedby, N. (2014). *Assessing 'Green Energy Economy' policies for transforming the building stock in Shanghai.* Paper presented at the 4th International Association for Energy Economics (IAEE) Asian Conference, Beijing, China.

Smedby, N. (2014). *Dialogue and Requirements in Malmö, Sweden: Assessing local programmes for energy efficient buildings.* Paper presented at the International Energy Program Evaluation Conference, Berlin, 9-11 September 2014.

Preface

This PhD project has been conducted at the International Institute for Industrial Environmental Economics at Lund University. It is a research environment characterised by an emphasis on societal relevance, interdisciplinarity, and collaboration with stakeholders.

The type of research setting is reflected in the two research projects within which the research was conducted: *LETS 2050* and *Urban Transition Öresund*. LETS 2050 stands for Governing **L**ow-carbon **E**nergy and **T**ransport **S**ystems for **2050**. This was a four-year project financed by the Swedish Environmental Protection Agency, Vinnova (the Swedish Innovation Agency), the Swedish Energy Agency and the Swedish Transport Administration. The aim of the project was to investigate the governance and institutional changes needed for transitioning towards a low carbon society 2050. The project was highly interdisciplinary, including 25 researchers from 10 different departments at various faculties. In particular, the project supported my interdisciplinary development as a researcher.

The Interreg project Urban Transition Öresund, supported by Interreg IVA under an EU grant from the European Regional Development Fund, was a three-year project with the aim of developing innovative solutions and strategies for sustainable urban development through cross-border collaboration. The project included five universities, as well as five municipalities from Sweden and Denmark's border region, the *Öresund* region. This project specifically strengthened my connection to real-life problems through valuable collaboration with municipal actors. It also contributed to international collaboration and eventually the co-authoring of a publication.

1 Introduction

"The crisis of sustainability is, above all else, a crisis of governance" argue Adger and Jordan (2009b, foreword). This is also the starting point for this thesis. Environmental challenges are taking on an increasingly global character (Steffen et al., 2015). At the same time, environmental governance is becoming more dispersed in terms of the actors and institutions involved (Hoffmann, 2011; Hysing, 2010; Jordan et al., 2015; Zelli & van Asselt, 2013). An increasingly broad array of actors are making governance claims to address the major environmental challenges of today. Among the actors that have been most visible in this regard are city governments (Bulkeley, 2010; McCormick, Anderberg, Coenen, & Neij, 2013).

A particularly influential example is climate change mitigation and especially the failure of the 15th Conference of the Parties of the UN Framework Convention on Climate Change in Copenhagen (UNFCCC) in 2009 to achieve a binding climate agreement. This constituted a remarkable setback for global environmental governance (Bäckstrand, 2011; Dimitrov, 2010). However, this failure also seems to have brought oxygen to the increasingly proactive environmental governance initiatives by other actors than the national or federal state, such as municipalities, corporations, and NGOs. Ironically, Copenhagen has since then been synonymous with the ultimate disillusion in terms of multilateral avenues for mitigating climate change (Bäckstrand, 2011; Dimitrov, 2010) at the same time as it represents the emerging governance alternative by being a world leader in sustainable urban development (Anderberg & Clark, 2012).

At the time of finalising this thesis, the Paris agreement has just been signed at the 21st Conference of the Parties of the UNFCCC. The agreement has been hailed as a success for the global governance of climate change. However, the intended nationally determined contributions, on which the agreement is based, are far from sufficient for reaching the agreed greenhouse gas (GHG) emission levels in order to stay within the 2°C scenario. Reaching the target instead hinges on the successive progression of the national contributions. This points to the continued importance of decentralised governance initiatives in pushing sustainability agendas, which has also been acknowledged in international negotiations and adhered to by cities, regions and businesses (UNFCCC, 2015a, 2015b).

This thesis engages with these increasingly dispersed claims on governing, more specifically with initiatives taken by local governments, and their potential ability to contribute to the addressing of current environmental challenges. It does so through

the concept *local environmental governance initiatives*. *Local*, in this regard, denotes the legal decision-making entity of a town or city (Gustavsson, Elander, & Lundmark, 2006). For the geographical setting of this thesis, that corresponds to the municipality. The focus on *environmental* governance means that the initiatives forming part of the governance are justified by the need to enhance environmental sustainability. The thesis contributes to the discussion of the patterns that emerge from governing activities and therefore the term *governance* is used (Adger & Jordan, 2009a). The new claims on governing translate into governance *initiatives*. Governance initiatives, in this thesis, refers to proactive policies or strategic endeavours in specific urban development projects. In local governance initiatives, municipalities go from implementing policies designed at higher levels of government, to formulating their own objectives and even challenging higher tiers of government. This often requires innovative governing practices. Due to their smaller scale and innovative characteristics, governance initiatives have experiment-like features. These types of initiatives have also been analysed as governance experiments (Castán Broto & Bulkeley, 2013; Hoffmann, 2011; van der Heijden, 2014b), vertical climate governance (Kern & Mol, 2013), and policy innovation (Jordan & Huitema, 2014b). These trends in governance break with dominating ideas on how to govern environmental problems.

In order to respond to the increasing prevalence of such governance initiatives, researchers have been analysing these changes by describing and mapping the various initiatives in place (see Bulkeley & Kern, 2006; Castán Broto & Bulkeley, 2013; Hoffmann, 2011; Knigge & Bausch, 2006; Lutsey & Sperling, 2008). For the area of climate governance, Lutsey and Sperling (2008) identified a common sequence of subnational governance including establishment of an inventory, development of an action plan for mitigation, setting of emission reduction targets, enactment of sector-specific policies and networking with other governments to leverage reduction. This thesis focuses primarily on the sector-specific policies and other governance initiatives. Local governments have different capacities by which they can exercise influence in this regard. Bulkeley and Kern (2006) typologise these in four modes of governing: self-governing, governing by authority, governing by enabling, and governing by provision.

Researchers have also been involved in discussing the theoretical implications of these more decentralised forms of governing in terms of their ability to contribute to environmental sustainability from polycentric governance or governance experimental perspectives (Cole, 2015; Hoffmann, 2011; E. Ostrom, 2009). However, knowledge is still lacking about the actual outcomes of local environmental governance initiatives in terms of their potential to address current environmental challenges and achieve radical change (Bulkeley, 2010; Hoffmann, 2011; Jordan et al., 2015; Millard-Ball, 2012a; Schreurs, 2008; 2014b), including how to assess such outcomes (Dimitrov, 2010). That is the research gap that this thesis addresses.

1.1 Dilemmas in environmental governance

In order to assess the potential of municipalities to address current environmental challenges, we need to understand the hitherto dominating practical environmental policy debate in relation to current environmental challenges. In the dominating view – influenced by the welfare economic approach, the role of public policy is to internalise externalities and thereby prevent environmental problems and maximise societal welfare (Pigou, 1920). Associated with this logic is also the emphasis on addressing environmental problems at their source, with the policy instrument matching the scale of the environmental problem (Brennan, 2009; Young, 2002). In environmental law, this is referred to as the "matching principle" (Adler, 2005; Butler & Macey, 1996). In accordance with this principle, local initiatives addressing global environmental challenges would not be likely to occur on a broader basis. As benefits are shared with a larger community than costs, free-riding behaviour would undermine such collective action (Hardin, 1968; Olson, 1965). This apparent paradox points to the need to assess whether the initiatives by municipalities are actually implemented and effective.

However, economic theories of collective action and environmental governance are not only challenged by the observed developments of actual governance. They are also challenged by the changing nature of environmental problems. As mentioned, environmental problems are becoming increasingly global. In addition, the causality between human interference with ecological systems and the associated environmental impact is becoming more and more complex, and the scale and urgency of environmental problems are becoming increasingly severe (Rockström et al., 2009; Steffen et al., 2015). Human-induced climate change, which is the environmental problem dominating the current environmental debate, reflects all these challenges, but it is also true for other environmental problems, such as biodiversity loss and chemical pollution. The changing nature of environmental problems has several implications for the analysis of environmental governance and the assessment of environmental policy instruments.

As regards the increasingly complex relationship between human interference with ecological systems and environmental impact, this includes the increasing pertinence of threshold and cocktail effects as opposed to linear relationships between pollution and environmental impact, leading to the need to reassess the benefits of addressing environmental problems one by one (Rittel & Webber, 1973; Voß & Kemp, 2006).[7]

[7] It also underlines the need for applying precautionary principles and ensuring that human interference with ecological systems stays within certain boundaries (Rockström et al., 2009; Steffen et al., 2015).

These different environmental problems may operate with differing geographical scope, challenging the scalar logic of the matching principle.

At the same time, as highlighted in work on reflexive governance[8], there is a dilemma in balancing between opening up policy analysis (and design) for the complexities of reality, or closing it down in order to identify effective policy solutions, known as the 'efficacy paradox of complexity' (Voß, Kemp, & Bauknecht, 2006). The experimental qualities of local governance initiatives may constitute one avenue for approaching such paradoxes (Evans & Karvonen, 2011).

The complexity of environmental problems, in combination with the urgency to decrease human interference with ecological systems, has also led to the need to assess the capacity of environmental institutions to achieve radical, or transformative, change, as opposed to incremental. This challenges the welfare economic approach to environmental policies, which tends to suggest first picking the "low-hanging fruits" in the sense of solutions with the largest impact in relation to cost. A transformative perspective highlights the risk of lock-in in this regard and the need to simultaneously address change in technical, social and institutional spheres.

Research with its roots in innovation theory has been particularly addressing the need for such radical change, and for avoiding lock-in in unsustainable socio-technical systems. Under the umbrella of socio-technical transitions, research streams influenced by evolutionary and institutional economics, for instance, as well as sociology and innovation research, have furthered the understanding of formation and up-scaling of new socio-technical systems (Geels, Hekkert, & Jacobsson, 2008; Jørgensen, 2012; Markard & Truffer, 2008). In particular the multi-level perspective, with its conceptualisation of new socio-technical solutions as embedded in a context of dominating "regime" systems and long-term influence from "landscape" factors (Geels, 2002), has become influential in relation to environmental governance research.

This body of transition research has also been developed into prescriptive governance concepts. Strategic niche management argues for the creation of protected spaces or markets in which learning, visioning and networking can be fostered in order to promote the development of new niches (Kemp, Schot, & Hoogma, 1998; Schot &

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[8] Reflexive governance for sustainability as elaborated by Voß et al. (2006) draws on systems and complexity theory and is related to ideas of wicked problems. Given that we understand sustainability problems as side effects of previous optimisation, reflexive governance approaches argue that solutions can only be preliminary, given the current understanding of the problem. Therefore Voß and Kemp (2006) highlight the importance of responsiveness and adaptivity of strategies and institutions. Reflexive governance should, according to this perspective, involve transdisciplinary knowledge production, experiments and adaptivity of strategies and institutions, anticipation of long-term systemic effects and measures, iterative participatory goal formulation and interactive strategy development (Voß and Kemp, 2006).

Geels, 2008). Transition management argues for the establishment of transition arenas as places for deliberation among a broad range of actors representing different perspectives. A transition arena serves as a platform for identifying problems with current systems (Kemp & Loorbach, 2006).

The emphasis on the need for transformative change is in tension with incrementalist perspectives on governance. As argued by Lindblom (1959), policy analysis and policy making are path-dependent and, in practice, involve comparing relatively similar policy alternatives, based on the contextual policy history in a form of "muddling through". Local initiatives may form a way to approach this tension between transformative and incremental change by allowing for incremental change at the local level, but more transformative change at higher levels of governance.

In light of these challenges in environmental governance, polycentric perspectives highlight the value of local environmental governance initiatives in terms of their experiment-like characteristics, potentially serving to build experience and coalitions for broader change (Cole, 2015; Jordan et al., 2015; E. Ostrom, 2009).

1.2 Research objective

The overarching objective of this PhD thesis is to contribute to knowledge on the role of local governance initiatives in addressing current environmental challenges. The research particularly explores and analyses proactive initiatives in the field of energy efficiency in new buildings, guided by the following research questions:

What are the outcomes of local governance initiatives for building energy efficiency, in terms of change in socio-technical systems and institutions?

How are different modes of governing employed in order to bring about achieved outcomes?

In order to respond to these questions, the research entails describing examples of local environmental governance initiatives, developing frameworks for their assessment in relation to current environmental challenges, and applying these frameworks. The frameworks address outcomes in socio-technical systems as well as in institutional spheres. Further, they address outcomes both within and beyond the target area of the individual initiative.

1.3 The case of building energy efficiency

Building energy efficiency is a key area for current environmental policy. The energy consumed in buildings represents a large part of overall energy consumption[9]. At a global level, the share is 31% of final energy use and in Europe 34% (Ürge-Vorsatz et al., 2012). In Sweden, the corresponding number is 39% (Swedish Energy Agency, 2015)[10]. Moreover, the availability of low or negative cost options for reducing energy use is repeatedly described as vast, the so-called energy efficiency gap (Allcott & Greenstone, 2012; Jaffe & Stavins, 1994)[11]. Therefore, increasing building energy efficiency is seen as a key strategy for increasing economy-wide energy efficiency and limiting overall energy use.

In the current policy debate, building energy efficiency is often framed as a climate issue, either directly through its contribution to diminishing GHG emissions stemming from buildings' energy use, or indirectly through the freeing of energy resources for substituting other, more carbon intensive, energy use (see, e.g. Commission of the European Communities, 2008). Indeed, the energy consumed in buildings represents 33% of global, energy-related CO_2 emissions (Ürge-Vorsatz et al., 2012) and building energy efficiency is often highlighted as the most cost-effective means of reducing GHG emissions (IPCC, 2014).

In Sweden, building energy use is not very carbon intensive, representing approximately 10% of energy-related CO_2 emissions (Swedish National Board for Housing Building and Planning, 2010). This is due to a high share of low-carbon electricity and district heating in building energy use. Still, decreasing building energy use is included in the National Environmental Quality Objectives, justified on the grounds that it contributes to increasing the economy's resource efficiency and to breaking Sweden's dependence on fossil fuels (Swedish Government, 2012; Swedish Parliament, 2005). Such a justification ought to reflect a system's perspective where decreased energy use in buildings provides for more efficient use of non-fossil fuels for substituting other energy use.

However, building energy use also relates to other environmental and societal challenges of different natures, such as resource scarcity, nuclear energy-related impacts or risks, biological diversity, energy poverty, health, and infrastructure development. The existence of policy instruments directly addressing energy demand

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[9] In addition to this come the embodied energy and CO_2 emissions incurred at earlier stages of the construction process. While relevant, this is beyond the scope of the thesis.

[10] That is, the joint share of the residential and service sectors.

[11] If transaction costs are considered, the gap becomes smaller.

reflects that energy use is associated with a complex of societal challenges that cannot only be addressed one by one.

Government intervention for building energy efficiency is often justified in light of a number of market failures, e.g. asymmetric information, principle agent problems and negative externalities from energy consumption, in combination with other market barriers such as split incentives, high discount rates in the building sector, and uncertainty[12]. These prevailing market barriers mean that theoretically more efficient institutional arrangements for addressing market failures, such as certain economic or information-based policy instruments, have limited effect if used as isolated measures (Allcott & Greenstone, 2012; Jaffe & Stavins, 1994). The prevailing market barriers are also the reason for building energy codes having come to play such a central role in ensuring building energy performance (Laustsen, 2008; Lucon et al., 2014).

The challenges associated with building energy use operate at different levels of geographical and jurisdictional scales, from the local (e.g. energy poverty) to the global (e.g. CO_2 emissions), which provide for governance initiatives at all levels. This is also an area where municipalities are generally seen to hold considerable powers (Erickson, Lazarus, Chandler, & Schultz, 2013). Based on an assessment of local authority and technical potential, the Stockholm Environment Institute (2014), for example, identifies energy standards on new buildings as the area where local governments can have the biggest influence on GHG emissions. However, many municipalities that want to encourage building energy efficiency are in reality facing limitations in terms of authority. This has provided for innovative governing practices, including dialogue-based approaches or binding requirements, based on the municipality's land-ownership as the source of authority. These practices are reflected in the empirical cases investigated as part of this thesis.

In the thesis, improvements in building energy performance are discussed in terms of radical versus incremental change. Radical is similar to transformative change and is understood as improvements that enable a building to have an energy performance in line with the highest class of common building energy classification schemes, such as the A level in the Swedish version of the CEN standards (see SiS, 2011), while living up to national regulatory requirements regarding other technical properties. Such buildings do not consume more than around half of the maximum energy required by Swedish regulation for its basic operation. Different concepts for such low energy buildings are referred to as niches in energy efficient buildings. One such niche referred to in the thesis is the passive house concept. There is a specific Swedish

[12] Based on Sutherland (1991), market failures are understood as "a condition in any **market** that results in an inefficient allocation of resources" whereas market barriers refer to "**market** conditions that discourage **energy-efficiency investments** relative to an estimated cost-effective level" [emphasis in accordance with the original].

definition of a passive house, which is the definition referred to in this thesis (see FEBY, 2009; Sveriges centrum för nollenergihus, 2012)[13].

1.4 Delimitations

Some overarching delimitations are highlighted below. For a more detailed description of the delimitations, see the methodology chapter (3) and the individual papers. The research focuses on local environmental governance initiatives as described above. This means that governing that merely serves to implement national policies, and governing that concerns only the municipalities' own estate, are beyond the scope of the research.

It should also be pointed out that the thesis focuses primarily on mechanisms through which governance is believed to contribute to change in the direction of environmental sustainability. It focuses on selected mechanisms in this regard. The issue of potential perverse effects of local climate governance are, for example, largely omitted from empirical investigation.

Empirically, this thesis focuses primarily on the energy performance of new residential buildings. It addresses the technical properties of the buildings, excluding aspects of user behaviour and operation of the built houses.

1.5 Geographical scope

Here, the geographical setting of Sweden, and of Malmö in particular, is introduced. The implications of the case selection, in terms of theory building and generalisability, are elaborated further in Chapter 3.

Sweden is the primary geographical setting of the research. It is a country well known for its environmental governance such as in the field of building energy efficiency, where it was known in the 1980s as a world leader (Schipper, Meyers, & Kelly, 1985). Building energy performance requirements have been included in the Swedish building code since 1975 (Kiss & Neij, 2011), making Sweden one of the pioneers in building energy efficiency policy. Sweden is still constantly ranked highly on climate change performance indexes, with energy efficiency being central to the country's high performance in this regard (see e.g. Germanwatch & Climate Action Network

[13] Except for in the Danish case, where the German definition applied.

Europe, 2016; OECD, 2014). Being part of the EU, Sweden's building regulation is now also subject to the EU Directive on Building Energy Performance (Directive 2010/31/EU) which demands that member states implement cost-optimal energy performance requirements and that policy measures are implemented to ensure that, by the end of 2020, all new buildings are so-called nearly zero energy buildings.

Sweden's 290 municipalities have played an important role in Swedish environmental governance, including the leadership in Local Agenda 21 programmes (Eckerberg, 2001) and, more recently, an active role in climate governance (Granberg & Elander, 2007). Their active role has been strengthened by a number of initiatives by the national government, including the Local investment programmes (LIP) and the Climate investment programmes (Klimp) as well as the Delegation for sustainable cities. All of these provided grants for fostering local projects for environmental sustainability, and municipalities were the largest recipients of these (Granberg & Elander, 2007; Swedish Environmental Protection Agency, 2010, 2013; Swedish National Board for Housing Building and Planning, 2014).

The city of Malmö occurs as an important geographical setting in all papers. Malmö is generally perceived as a city with a strong environmental profile (Anderberg, 2009; Dannestam, 2009; Fitzgerald & Lenhart, 2016). As part of a structural change, from an industrial city dominated by its shipyard, to a knowledge and service-based city, Malmö hosted the environmentally oriented housing exhibition Bo01 in 2001. Bo01 became very well known as a prominent example of a sustainable neighbourhood despite some weaknesses, including poor goal fulfilment in building energy use (Fitzgerald & Lenhart, 2016; Fraker, 2013).

The active and strategic work for environmental sustainability in Malmö has been continued throughout the 2000s. In particular, the former shipyard area of the Western Harbour, where Bo01 took place, is at the heart of the city's sustainability brand. Buildings and energy have been central in this strategic work. The city has been widely acknowledged for its sustainability efforts, including being ranked as number one in terms of environment among Sweden's 290 municipalities in 2013 and 2014 and receiving UN-Habitat's Scroll of Honour award in 2009. Malmö is engaged in a number of sustainability-oriented city networks, including Energie-cities, ICLEI and Eurocities.

In Malmö City's environmental programme for 2009 to 2020, a goal of being Sweden's most climate-smart city in 2020 has been formulated. In 2020, the municipal organisation aims to be climate neutral and in 2030, the entire geographical area of the municipality is to be supplied by 100% renewable energy. One of the sub-targets for achieving this is to lower the energy use per person by 20% by 2020 and another 20% by 2030, as compared to the average energy use in 2001-2005. In 2009 a natural gas combined heat and power plant was opened by E.ON, which drastically increased the city's GHG emissions (Lenhart, Bouteligier, Mol, & Kern, 2014). This underscored the importance of energy efficiency for reaching

climate targets. The most recent assessment of the progress in relation to the city's climate goals indicates that it will be difficult to reach the targets (Malmö City, 2016). Other focal areas in the City's environmental plan are resource efficiency, good urban environments and the promotion of sustainable consumption. Increasingly, the City has been attending to the social challenges of the city within the frame of their sustainability work.

1.6 Research process and papers

The local environmental governance initiatives in this thesis have been researched through a collection of research papers. An overview of these is provided in Table 1. The papers are presented in the chronological order in which they were written. The starting point for the studies in the individual papers has been the different governing approaches applied. The sequence of papers also mirrors the development of these governing approaches in local environmental governance and the associated learning processes, with paper I addressing early governance experiences, and papers II and III addressing governing approaches that built on these experiences. Paper IV takes a longer temporal perspective and also includes the most recent developments, including the local initiatives' interplay with other government levels but also goes further back in time.

Paper I addresses a set of initiatives for collaborative planning for environmentally sustainable development, the Constructive Dialogue, as implemented in specific urban development projects in six Swedish municipalities. The collaborative planning initiatives, as developed in the Constructive Dialogue, exemplifies the movement from more traditional planning to a form of local environmental governance in urban development projects. The governance approaches in the Constructive Dialogue were experimental, reflecting the initiative's aim to foster the development of new methods in planning.

The Constructive Dialogue was followed by an increasing spread of programmes with energy requirements applicable to new buildings developed on municipal land. The share of municipalities claiming to impose such requirements increased from 22% (of 290) in 2007 to 40% in 2009 and 62% in 2011 (SALAR, 2010, 2012). Fifteen percentage points of the 62% imposed such requirements on a more regular basis. These types of programmes reflected an ambition to mainstream the governance of building energy efficiency and consolidate it through binding requirements. One of these programmes, Miljöbyggprogram Syd (hereinafter MBP South), has been addressed in papers II and III. This was partly combined with a development of the Constructive Dialogue, called the Developer Dialogue, which is also addressed in papers II and III.

Table 1 Overview of the thesis papers

N°	Author(s)	Title	Unit of analysis	Relevant policies	Geographical setting	Analytical focus
I	Smedby, Nora and Neij, Lena	Experiences in urban governance for sustainability: The Constructive Dialogue in Swedish Municipalities	A concept for collaborative planning for environmental sustainability as implemented in planning projects in six different municipalities	The Constructive Dialogue. Part of the Building-Living Dialogue	Gothenburg, Hofors, Kalmar, Karlstad, Malmö, and Stockholm, all in Sweden	Institutional capacity building, sustainability and environmental outcome
II	Smedby, Nora	Assessing local governance experiments for building energy efficiency – the case of Malmö, Sweden	A set of policy instruments in the City of Malmö	MBP South and Developer Dialogue	Malmö, Sweden	Effectiveness: Intermediate and immediate outcome. Construction and operating costs.
III	Smedby, Nora and Quitzau, Maj-Britt	Municipal governance and sustainability: The role of local governments in promoting transitions	A set of governing practices as combined in two sustainability oriented urban development projects	MBP South and Developer Dialogue in Malmö and a context-specific planning approach in Egedal	Malmö Sweden and Egedal, Denmark	Socio-technical translation, modes of governing
IV	Smedby, Nora	Local environmental governance and institutional change: Multilevel governance and building energy efficiency in Sweden	The institution of regulatory energy performance requirements on residential buildings at three levels of government	MBP South, Swedish National Building Code, European Directive for Building Energy Performance	Stockholm, Gothenburg and Malmö; Sweden, EU	Multilevel governance, gradual institutional change

Note: For a description of the relevant policies, see Table 2.

As part of this development, municipalities also strategically addressed the border area between mainstream (regime) construction and niche solutions for sustainability in urban development projects. This aspect of local governance initiatives is addressed in paper III. Paper IV places local governance initiatives in a multilevel governance context by investigating the policy developments at the local level in relation to policy developments at other governance levels. An overview of key policies is provided in Table 2.

The papers also complement each other in terms of analytical focus. Paper I aims to address institutional outcomes of the governance initiatives as well as outcomes in socio-technical systems. Paper II, on the other hand, takes a quasi-experimental approach, seeking primarily to establish evidence on the outcomes in socio-technical systems. Paper III draws on transition theory to discuss the potential of local governance initiatives to contribute to the more fundamental alteration of construction practices. Paper IV addresses outcomes associated with policy change from local environmental governance initiatives from a multilevel governance perspective.

Table 2 Key policies occurring in the research

Policy	Original Swedish name	Description
The Constructive Dialogue	Det Goda Samtalet	A concept for collaborative planning for environmental sustainability developed within the broad dialogue project, the Building-Living Dialogue. The Building-Living Dialogue's objective was to achieve a sustainable building and real estate sector within one generation. The Constructive Dialogue is based on the early involvement of different stakeholders in the planning process. It is also known in English as The Creative Dialogue.
Developer Dialogue	Byggherredialog	An approach for collaborative planning developed in Malmö as this municipality's version of the Constructive Dialogue. It focuses specifically on bringing together a diverse group of building developers and different parts of municipal administration in a dialogue on how to strengthen the sustainability profile of a new development.
MBP South	Miljöbyggprogram Syd	Meaning approximately Programme for Environmentally Sustainable Construction in South Sweden, MBP South was a programme developed in the City of Malmö and municipality of Lund, including energy and other environmental requirements on buildings. The building developer could choose the ambition level, A-C, which then became binding through the association with the land allocation agreement)

1.7 Thesis outline

The introduction is followed by Chapter 2, in which the theoretical streams underpinning the research are discussed. This includes governance research, with particular focus on local governance as multileveled and polycentric. It also introduces the analytical frameworks applied in the specific papers. Chapter 3 presents an overview of the methodological foundations of the thesis, as well as a presentation of the methods for data collection and analysis employed. Chapter 4 provides brief summaries of the objective, framing and results of the individual papers. In Chapter 5, a concluding discussion is presented. The second half of this thesis consists of the collection of four papers as presented in Table 1.

2 Theoretical foundations and analytical approaches

This thesis positions itself within governance research as it applies to local environmental governance. In this chapter, a theoretical context for the analysis and assessment of local environmental governance initiatives is depicted. Different outcomes through which local governance has been argued to contribute to addressing environmental problems are introduced, and frameworks for assessing some of these outcomes are presented. For a more detailed elaboration of the specific frameworks for the assessment of local environmental governance, see the individual research papers appended to this thesis.

As outlined above, this thesis focuses specifically on the area of building energy efficiency. Building energy efficiency is particular as an object of environmental governance. For example, it is associated with a complex set of challenges of collective action, both environmental and non-environmental. The implications of looking at governance within this particular policy field will be highlighted throughout the section.

2.1 Environmental governance, institutions and policy

Governance is understood here as the patterns that emerge from governing activities (Adger & Jordan, 2009a, p. 11). Governing activities, in turn, refer to "the modes and practices of the mobilisation and organisation of collective action" (Coaffee & Healey, 2003). Accordingly, the term governance, as opposed to government, allows for an analysis which is not confined to certain actors (such as the state), nor to certain levels of government (such as the national), or governing techniques (Bulkeley, Watson, & Hudson, 2007). Further, the definition implies that governance is employed as an analytical, rather than a descriptive concept (Adger & Jordan, 2009a; Jollands, Gasc, & Bryan Pasquier, 2009).

However, the descriptive use of the term governance, as denoting specific characteristics of governing activities, is also widespread[14], and therefore merits clarification. A common use of the term governance in this regard is to describe changes in governing as changes from government to governance, which generally describes a development where states have come to play a less important role in the organisation of collective action (Hysing, 2010; Rhodes, 1996). In this thesis, such governance is broadly referred to as network governance.

While defining *the term* governance as a primarily analytical concept, this thesis does take a state-centric perspective on governance, in the sense that politically appointed bodies and state institutions are seen as (potentially) playing a central role in governing processes (Hildingsson, 2014; Jordan & Huitema, 2014a)[15]. This role varies between geographical settings and policy areas in terms of capacity, modes of governing, locus of authority (government level) etc., and is therefore an important area for research (Hildingsson, 2014; Hysing, 2010; Jordan et al., 2015). An important observation, which has shaped the research in this regard, is that the role of local governments in addressing environmental challenges has changed, particularly as part of developments in climate governance (Balme & Ye, 2014; Betsill, 2001; Bulkeley, 2010; Lafferty, 2001).

A central element of governance is comprised of the institutions, or "rules of the game" through which collective action is organised. Institutions consist of regulative, normative, and cultural-cognitive elements of these regularized practices (Scott, 2001). The regulatory institutions often go under the heading formal institutions. These are often attended to by scientists rooted in rational choice theories. Normative institutions are based on values and other norms. Cognitive institutions can be understood as the lenses through which we make sense of the world. These forms of institutions are followed because we take them for granted. The two latter types of institutions are often central in anthropologists' and sociologists' institutional analyses (Hall & Taylor, 1996; Scott, 2001). While all three elements are present in most institutions, there are variations in the extent to which they dominate. This thesis focuses primarily on regulative institutions[16] [17].

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[14] As it has also been widely criticised (see, e.g. Hysing, 2010; Imrie & Raco, 1999; Rhodes, 1996, 2007).

[15] This position is, for example, supported by Madureira (2014) in the study of planning in Sweden.

[16] Such a delimitation allows for the distinction between ideas and institutions (Lieberman, 2002). It also allows for the analysis of mismatch between institutions and their implementation (Streeck & Thelen, 2005).

[17] A parallel analytical frame has here been used for a more practical analysis of the governing practices at the local level. These governing practices have been characterised in terms of modes of governing. This is further elaborated on in section 2.2.3.

Institutions occur at different levels of aggregation (Greif & Laitin, 2004; see similarly Paavola, 2007 on functional tiers of institutions), with the most aggregate being political regimes, and the least aggregate being public policies (Pierson, 1993; Streeck & Thelen, 2005). Rules at all ends of this continuum are relevant to the research project at hand. However, the primary unit of analysis is public policies. These, in turn, are understood as "political agreement on a course of action (or inaction) designed to resolve or mitigate problems on the political agenda – economic, social, environmental, and so on" (Fischer, 2006, p. 2). The term governing practices is used to refer to the actual governing processes into which these policies translate.

Local environmental governance initiatives can be more or less institutionalised, even if they generally are characterised by a lower degree of institutionalisation than national level governance. Early experimentation is characterised by ad hoc approaches. As experience accumulates, the initiatives often develop into institutions for proactive local environmental governance. This continuum of institutionalisation reflects a trade-off in terms of flexibility and responsiveness on the one hand, and legitimacy, stability, and possibly efficiency on the other hand (Anguelovski & Carmin, 2011). The governance initiatives addressed in this thesis span across this continuum.

In two of the papers, institutional frames for analysis are used explicitly. In paper I, institutional capacity building is analysed as a potential outcome of a collaborative approach to spatial planning for sustainability. This is further described in section 2.3.1. In paper IV, the concept of gradual institutional change is used for analysing local environmental governance's interplay with other levels of government, as elaborated in section 2.3.4.

The primary object of governing in this thesis is building energy performance[18]. Since the main justification for the investigated governance initiatives is environmental, in particular the need for transitioning to a low carbon energy system (Gothenburg City, 2009; Malmö City, 2009; Malmö City, Lund Municipality, & Lund University, 2012; Stockholm City, 2012), the initiatives are studied from an environmental governance perspective. Environmental governance, in this context, refers to governance addressing problems of collective action related to environmental resources, with environmental resources including renewable and non-renewable natural resources, environmental sinks as well as bio-diversity and environmental safety at all scales (Paavola, 2007). Such a definition excludes governance addressing other policy areas but impacting environmental quality. Albeit relevant from an environmental perspective, such governance is beyond the scope of this research.

[18] With the exception of paper I, which addresses a broader governance initiative.

However, the definition *includes* governance in which environmental concern is one of several motivations[19].

Another implication of the focus on building energy performance is a focus on socio-technical systems as an important point of mediation between human activity and environmental impact, with emphasis put on the technical aspects. A socio-technical system refers to "the linkages between elements [such as artefacts, knowledge, capital, labour, cultural meaning] necessary to fulfil societal functions" (Geels, 2004). In the case of this thesis, the primary function addressed is that of housing. A socio-technical system incorporates the production, distribution and use of technology and operates in close connection to institutions and actors. The focus on socio-technical systems as central to the analysis of environmental governance is shared with, for example, sustainability transitions research (Geels et al., 2008).

2.2 Local environmental governance

Local environmental governance holds similarities to as well as differences from governance at other levels. In the following section, some of the specific prerequisites are discussed.

2.2.1 Multilevel and polycentric perspectives on local environmental governance

This thesis addresses primarily the governing practices of local governments. However, in relation to energy and associated environmental problems at different levels, local governments cannot be understood as operating in isolation, but must be analysed in relation to civil actors and other levels of government. The perspective of multilevel governance highlights this need to understand governance, both as taking place in concert with civil and public actors, and as involving several levels of government. It was originally developed to study the restructuring of governance and the associated diminishing role of nation states in the EU. In this context, multilevel

[19] Environment is often presented as one dimension in the concept of sustainability. Often, the so-called triple bottom line of sustainability is emphasised and a pure environmental perspective is critiqued on the grounds that it ignores economic and social aspects of sustainability. Here, these different facets of sustainability are not seen as being in conflict; instead, the major conflict line is between the short term and the long term perspective. While social wellbeing is the objective, and the economic system the means for resource allocation, environmental resources set the boundaries. If a longer time frame is adopted, which is the imperative of *sustainability*, environmental degradation inhibits economic prosperity for social wellbeing.

governance was defined as "a system of continuous negotiations among nested governments at several territorial tiers – supranational, national, regional and local – as the result of a broad process of institutional creation and decisional reallocation" (Marks, 1993, p. 392). Environmental policy is an area where multilevel governance has become particularly relevant (Balme & Ye, 2014; Selin & VanDeveer, 2009).

A critique against the research on multilevel governance is that it tends implicitly to take a top-down perspective, despite the local level in practice becoming increasingly proactive (see Fairbrass, Jordan, & Flinders, 2004; Kern & Mol, 2013). Many local policies are even developed in contention with their constitutionally defined competences (Peters & Pierre, 2004).

One way to embrace a less hierarchic analytical approach has been through the distinction between two types of multilevel governance (Marks & Hooghe, 2004). Type I assumes relatively stable authority and non-overlapping jurisdictions in line with federalist ideas. This is more focused on governments than on specific policy areas. Type II, on the other hand, operates from the assumption of flexible, overlapping jurisdictions and the view of governance as something complex and fluid with a task-specific focus. The type II perspective fits well with the type of proactive initiatives investigated in this thesis and has been further elaborated through the concept of polycentric governance (Betsill & Bulkeley, 2006; Marks & Hooghe, 2004).

The perspective of polycentric governance draws strongly on new institutional economics in order to analyse complex governance structures in relation to the problems of providing public goods and conserving common-pool resources (collective action problems). Polycentric systems are "characterized by multiple governing authorities at differing scales rather than a monocentric unit" (E. Ostrom, 2010).

While initially applied to the provision of public services, such as police protection or water provision (V. Ostrom, Tiebout, & Warren, 1961), the concept has recently been applied to global level environmental challenges, primarily climate change (Jordan et al., 2015; E. Ostrom, 2010). At the same time, in line with reflexive governance approaches and concepts of wicked problems (Rittel & Webber, 1973; Voß & Kemp, 2006), polycentric governance builds on a logic that environmental problems cannot be compartmentalised, but must be understood as a complex. In this sense, a "polycentric climate governance" system is not only a governance system for GHG mitigation, but governance that addresses climate change as one of several integrated problems. The perspective of polycentric governance in terms of its drivers and associated potential for contributing to addressing current environmental challenges is further elaborated in the following subsections.

2.2.2 Drivers for local environmental governance initiatives

Much of the analysis of local environmental governance takes the increasing proactive role of local governments as a starting point. Nevertheless, understanding the drivers behind such a development is crucial in order to assess feasibility of local initiatives as part of broader, and more radical change.

As outlined above, conventional approaches to environmental policy have little expectation of municipalities driving their own policy agenda for addressing global environmental challenges. According to these perspectives, lower levels of government may possibly have incentives to signal a concern for collective action problems at higher levels (e.g. in order to attract resourceful residents), but have little incentive to take the cost of actually implementing associated policies (Brennan, 2009). While, for global environmental problems, such incentive problems may apply to both national and local levels of government, they are amplified, the lower the level of government (Olson, 1965).

The polycentric perspective questions this prediction, arguing that the empirical development has disproved it (Lutsey & Sperling, 2008; E. Ostrom, 2010). It explains the development by stating that problems of collective action operate simultaneously at multiple scales. For the example of climate change, it is argued that local initiatives, such as those addressing building energy efficiency, come with a number of co-benefits such as improved local air quality, savings on energy related costs and local job creation (Bai, 2007; Betsill, 2001; E. Ostrom, 2010)[20]. Therefore, local governments may hold incentives to implement effective governance initiatives, which also address global environmental problems.

It is worth noting that the perspective builds on the presence of co-benefits in order for polycentric governance to emerge. Building energy efficiency, which is replete with positive effects additional to GHG mitigation, can then be expected to be an area characterised by polycentric governance. Issues with high costs and only contributing to change in few dimensions, such as carbon capture and storage, on the other hand, are less likely to contribute to a polycentric governance structure.

Another theoretical stream, that of ecological modernisation, rather emphasises the competitive benefits of being a pioneer, for example, in terms of the development of marketable innovations, in explaining frontrunner behaviour such as local proactive environmental governance (Jänicke, 2008).

[20] It is not given that co-benefits from policies that encourage reduced GHG emissions should be more significant than co-benefits of other policies. However, the strong local interest in GHG mitigation supports this being the case.

2.2.3 Modes of governing at the local level

Increasing claims on governing require the development of new governing practices at the local level. Governance can be characterised in many ways. For the characterisation of governing practices, typologies of policy instruments, such as regulatory, economic and information-based (Vedung, 1997), are commonly used. Bulkeley and Kern (2006) have developed a similar typology of so-called modes of governing[21], specifically at the local level. This has been used throughout the research project. It is based on the different governing capacities brought to bear, resulting in four different modes: self-governing, governing by provision, governing by authority, and governing by enabling. In applying this typology, it has also been important to distinguish between the different roles through which these modes of governing are exercised, including the role as a regulator, as a landowner and as a public service provider. These two dimensions of local governance are partly overlapping (as in the case of governing by provision) but, as an example, both the role as a regulator and as a land-owner can provide power to govern by authority.

Self-governing refers to the governing of the municipality's own organisation. An example could be to ensure the energy performance of the municipality's own buildings, such as offices of the administration or schools. It is based on the capacity of organisational management. This is the most straightforward way for a municipality to govern. This is also why initiatives in this mode are not seen as proactive and, hence, the mode is of limited relevance for this thesis.

Local government has the responsibility of ensuring the provision of different services, such as technical infrastructures for water, sewage, and energy, providing a source of power and a mode of governing, *governing by provision*. In the case of building energy efficiency in the Scandinavian context, district heating is a highly relevant example. This mode of governing is addressed in paper III.

Governing by authority is characterised by the threat of sanction in case certain requirements are not followed, similarly to regulatory policy instruments (Vedung, 1997). In many countries, an important basis for governing by authority is through detailed development plans, which are legally binding. Governing by authority also includes municipalities' role in enforcing national policies such as building regulation. However, the local governments' ability to govern proactively on the basis of their role as a public authority is limited. The inability to prescribe certain technical properties of buildings through the detailed development plans, such as building energy performance, has contributed to local governments instead using their position

[21] This usage of the concept *modes of governing* differs from e.g. Bulkeley et al. (2007) and Hysing (2010) who use it to more broadly describe governing, including, for instance, the governmental rationalities and actor constellations at play.

as landowners for setting such requirements in civil land allocation agreements, for example, in Denmark, Germany, the Netherlands and Sweden (Bulkeley & Kern, 2006; Quitzau, Hoffmann, & Elle, 2012; Smedby, 2016; Tambach & Visscher, 2012). That is, the role *as* an authority is insufficient for governing *by* authority (i.e. by the threat of sanction). This mode of governing is represented in papers II-IV.

Governing by enabling includes diverse strategies based on persuasion and negotiation and includes both economic and information based instruments. Network based forms of governing also fall under this category. This mode of governing is represented in paper I-III.

To a varying degree, the three modes of governing combine different institutional dimensions, including regulatory, cultural-cognitive and normative. For example, it is not only formal sanctions that determine an actor's willingness to comply with an authority-based policy, but also normative institutions.

In addition, local governments combine the different modes of governing in innovative ways in order to gain institutional capacity (Holm, Stauning, & Søndergård, 2011). This is in line with Van der Heijden (2009b), for example, who points to the effectiveness of applying a facilitative enforcement style in building energy regulation. Such a facilitative enforcement style rests on the combination of enabling and authoritative modes of governing. Papers I-III include such combinations of different modes of governing.

2.2.4 Outcomes of local environmental governance initiatives

This section provides an overview of the different outcomes through which local environmental governance is commonly argued to contribute to environmental sustainability, based on previous literature (Cole, 2015; Hoffmann, 2011; Jordan et al., 2015; Knigge & Bausch, 2006; Mulugetta, Jackson, & van der Horst, 2010; E. Ostrom, 2010; Sovacool & Brown, 2009; van der Heijden, 2014b)[22]. The outcomes are summarised in Table 3. They are described along two dimensions: a) whether they constitute direct outcomes within the governance initiative's target area or whether they reach beyond this target area, and b) whether the outcome is related to change in

[22] There is also a less optimistic vein of research (Zelli & can Asselt, 2013) arguing that forerunner initiatives, such as those by proactive municipalities, might lead to perverse effects. One such perverse effect is leakage, where environmentally harmful activities are directly or indirectly relocated and no overall environmental benefit is achieved. The specialisation of economies as either "clean" or "dirty", resulting from this leakage could also serve to increase fragmentation and thereby impede transformative change on a broader scale (Wiener, 2007).

socio-technical systems, or to change in institutions. This is a simplified typology and many local initiatives may relate to change in all these different spheres. But the two dimensions are deemed useful for a broad mapping of the mechanisms at play. This thesis to some extent addresses mechanisms in all these spheres.

Table 3 Outcomes of local environmental governance initiatives

	In the target area	Beyond the target area
Socio-technical systems	Incremental improvement	Nurturing of niches
	Radical improvement	Translation
Institutions	Organisational infrastructure-building	Policy-learning
	Trust-building	Policy demonstration
	Networking	Vision-building
	Institutional capacity-building	Agenda-setting
		Coalition-building
		Institutional competition

First, local proactive environmental governance may contribute directly to minimising environmental impact originating from an addressed target area within the local jurisdiction. For initiatives primarily addressing socio-technical systems, such as those analysed in this thesis, this means that the governance initiative contributes to the adoption of environmentally preferable socio-technical systems. An incremental change can be achieved by integrating single innovative elements in the mainstream solution. A radical change, in contrast, means a more holistic redesign of the socio-technical system (Smith, 2007).

As outlined in the introduction, traditional approaches to collective action predict that local governments will not take measures to address environmental challenges with impacts covering a significantly larger geographical scope than that of the local government. Therefore, it is important to assess the effectiveness of local governance initiatives, which are often justified on grounds of global environmental challenges. A challenge is to establish causality. Millard-Ball (2012a, 2012b), for example, shows that the intermediate outcomes of climate plans in US cities was actually a spurious relationship that could be traced back to the environmental preferences of the residents.

Paper I relied primarily on previous literature's assessment of goal achievement and interviews for assessing the effectiveness in this regard. In paper II, a quasi-experimental approach was taken to assess the additionality of the initiative (see further section 2.3.2 and paper II). Effectiveness is not only important to ensure that the direct environmental benefit associated with the policy actually occurs. It is also crucial in ensuring the trust-building function of local environmental governance.

Indeed, trust-building is a core mechanism by which local environmental governance initiatives can contribute to the governance of global environmental problems, as argued by polycentric governance scholars (Cole, 2015; E. Ostrom, 2010). The failure to address the issue of climate change on a global scale is, for example, closely associated to lack of trust. Trust-building enables broader mobilisation in terms of coalition-building and networking (van der Heijden, 2014b). At the same time, there is a risk that the local environmental governance initiatives foster the mobilisation of counter coalitions blocking more ambitious policies (Mahoney & Thelen, 2010a). In this regard, procedural – or institutional – outcomes of local environmental governance may be just as important as the outcomes in socio-technical systems (Jordan et al., 2015). Moreover, in network-based forms of governing where goal-setting may involve those who are to be governed, assessing the process for setting these goals may be much more relevant than evaluating goal achievement per se (Vedung, 2006).

Among the institutional outcomes of local environmental governance initiatives are also more concrete aspects, such as the development of inventories and management systems related to the environmental challenges addressed or the organisation of systems of monitoring and enforcement (Hoffmann, 2011).

In this thesis, institutional outcomes within the target area of governance initiatives are addressed in paper I through the concept of institutional capacity-building as further developed in section 2.3.1.

When it comes to outcomes that contribute to change beyond the target area of the governance initiatives, these are often referred to broadly in terms such as innovation and learning (E. Ostrom, 2010). These can refer to socio-technical as well as institutional spheres. The attention to such outcomes is partly rooted in an evolutionary logic, where polycentric governance systems are seen as fostering diversity and selection of new solutions, which become fit enough to spread. In terms of change in socio-technical systems, if local proactive environmental governance fosters the nurturing or deployment of new socio-technical solutions, this might spread to a broader market and thus foster change beyond the local setting. However, there is also a contradiction in that the institutional fragmentation associated with polycentric governance may limit the market for certain innovations (E. Ostrom, 2010; Sovacool & Brown, 2009). This thesis looks specifically at socio-technical innovation through the concept of translation (see section 2.3.3 and paper III).

Also when it comes to institutional innovations, these are based on an evolutionary logic of variation and selection. As described by Cole (2015) "a truly polycentric system is one in which governmental units both compete and cooperate, interact and learn from one another". Similarly, Hoffman's (2011) analysis of governance experiments builds on their potential to self-organise in order to fulfil the various institutional functions required for governing global environmental challenges. This includes smooth processes of policy-learning, and policy demonstration as well as

more conflictual processes of agenda-setting, coalition building and institutional competition (Engel & Saleska, 2005; Hoffmann, 2011; Knigge & Bausch, 2006; Schreurs, 2008; Sovacool & Brown, 2009; van der Heijden, 2014b). These types of institutional outcomes can operate horizontally, for example, between different local governments, as well as vertically, between different levels of government (Kern, 2010). This thesis focuses on vertical interplay between different levels of government as one aspect of institutional change beyond the local. This has been analysed through the concept of gradual institutional change, as developed in section 2.3.4 and paper IV.

Just as, according to Ostrom (2010), the assumption of local governments' inaction was not empirically grounded, Jordan et al. (2015) warns for over-enthusiasm when it comes to the ability of polycentric governance to address global sustainability challenges. Research so far has mainly taken the form of forward reasoning and hence been rather vague on the actual functioning of these mechanisms. For example, the initiatives are said to foster innovation. What type of innovation, and how? In the following section, the specific analytical approaches applied in the thesis for assessing some of the different outcomes are presented.

2.3 Analysing the outcomes of local environmental governance

The choice of analytic focus for assessing the outcomes of local environmental governance initiatives has been guided by the ambition to cover both socio-technical and institutional outcomes, within the initiatives' target area as well as beyond. The specific frameworks have been developed in an inductive way, drawing on existing concepts and approaches deemed relevant for the specific governance initiatives. These are further presented in this section.

2.3.1 Institutional capacity building

Many of the local initiatives addressing global sustainability challenges have both substantive and procedural objectives. This was, for example, the case for the research presented in paper I, where an initiative to achieve an environmentally sustainable built environment through the development of collaborative planning processes, the so-called Constructive Dialogue, was investigated.

When it comes to governance including procedural objectives, yet justified on environmental sustainability grounds, it is important to develop evaluation frameworks, which integrate outcomes in socio-technical and institutional spheres. Experiences from transition management cautions the risk of being caught up with

technologies of governance, rather than with the environmental challenges at hand (Meadowcraft, 2009).

In paper I, the concept of institutional capacity-building was addressed in order to assess the institutional outcomes and link these to substantive environmental outcomes. Within a collaborative planning perspective, Magalhães, Healey, and Madanipour (2002) use the concept of institutional capacity for denoting "capacity of urban governance to make a difference in sustaining and transforming the qualities of cities". The concept has been used for describing and evaluating institutional arrangements (Innes & Booher, 2003; Polk, 2011). Institutional capacity, interpreted in such a way, consists of relational resources, knowledge resources and mobilisation capacity. It is argued that these components are key when operating in collaborative (or network-based) governance settings (Healey, Cars, Madanipour, & Magalhães, 2002).

In paper I, the conceptualisation of Magalhães et al. (2002) is drawn upon and combined with the assessment of sustainability and environmental outcome, in order to assess the Constructive Dialogue. The institutional theory drawn upon in this regard is different than the institutional theory used in paper IV, focusing more on cultural cognitive and normative dimensions of institutions than the regulatory dimensions.

2.3.2 Effectiveness

For policies addressing socio-technical systems, assessing outcome includes assessing the development of environmentally preferable socio-technical systems. Effectiveness relates to whether these policies are implemented at all, to whether targets were reached, and to whether this can actually be attributed to the policy at hand or if it would have happened anyway, additionality (Vedung, 1997).

Additionality may be impeded by the setting of low targets or by the fact that a policy targets a policy area, which is also addressed by other initiatives. The latter in particular is relevant in a polycentric perspective on local environmental governance. According to this perspective, initiatives by local governments may be expected in policy areas associated with considerable co-benefits. We can therefore expect other actors than municipalities to have initiatives in place addressing the same issue as municipal governance initiatives. In the field of building energy performance, for example, building developers have often developed their own guidelines, or they use different types of labelling schemes.

Within evaluation research, there are two main approaches for assessing effectiveness, the evidence-based and the theory-based. These, in turn, represent two different research logics, the variance-based and the process-based (Van de Ven & Poole, 2005). The former seeks to establish validity through experiment-like research designs

and emphasises the virtues of quantitative methods (Davies, 2012; Pawson, 2002). The latter seeks to establish validity by investigating the causal steps through which the policy is believed to function (Chen, 1990). One challenge with applying evidence-based approaches for analysing policy is the lack of natural experiments. However, many local initiatives actually provide for good case studies in that they exhibit characteristics of natural experiments. This is the case for paper II. Through an experimental research design, the paper compares buildings subject to a specific local policy to those that are not, controlling for other factors that may possibly be influencing.

2.3.3 Translation

Local proactive environmental policies are also argued to contribute to technical innovation more broadly, that is, to foster socio-technical change processes beyond the immediate target area of the policy. The research carried out within this PhD project, in particular paper III, specifically pointed to aspects of mainstreaming as relevant in this regard.

In order to discuss the role of municipalities in fostering radical socio-technical change through mainstreaming, transition theory was drawn upon, in particular the concept of translation. Transition processes are described as either a replacement of a regime with a niche or the transformation of the existing regime by incorporation of niche innovations, in light of external, so-called landscape pressures (Raven, 2007)[23]. The niche is conceptualised as an incubation room for novelties, with an alternative, less structured configuration of actors, artefacts and institutions than the regime, which in turn represents the dominant socio-technical solution (Smith, 2007). The niche is global and consists of the aggregated experience from individual *niche projects* (Geels & Deuten, 2006).

While a transition process might be framed as a temporary and relatively swift process, transitions are often incremental in practice. Niches and regimes co-exist and are reshaped in relation to one another over time (Smith, 2007). These processes of co-constitution are closely associated with the aspect of mainstreaming and have recently been attended to under the concept of translation (Boyer, 2015; Raven, Verbong, Schilpzand, & Witkamp, 2011; Seyfang, 2010; Smith, 2007)[24].

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[23] For further elaboration see Smith, Stirling and Berkhout (2005) and Geels and Schot (2007).

[24] Translation is also used in other theoretical contexts, such as actor-network-theory (see, e.g., Callon, 1986) and theories on institutional change (Campbell, 2010). However, their use of the concept is different from the way in which it is applied within this research.

A challenge in fostering transitions is the multidimensional character of socio-technical systems, including institutional, social and technical dimensions. This means that a number of change processes need to be coordinated. Further, these socio-technical systems are embedded (or locked in) in broader structures in all these dimensions (Geels et al., 2008; Smith, 2007). As a result, feasible niches remain to be exploited. The large energy efficiency gap in the building sector indicates that this problematique is particularly large in this sector[25].

Socio-technical translation may serve to accommodate socio-technical systems according to all these dimensions and according to wider structures, so as to catalyse transition[26]. Therefore, an important task in governing transformative change is to enhance such translation. Previous research has pointed to local projects, which bring together niches and regimes in a pragmatic spirit, so called intermediate projects, as potentially important in this regard (Boyer, 2015; Smith, 2007). Indeed, local governance appears as increasingly attending to such intermediary projects (Jensen & Gram-Hanssen, 2008). That is also the case for the governance initiatives addressed in this thesis.

In characterising translation, Smith (2007) distinguishes between translation that involves the transfer or reinterpretation of single elements of niches or regimes and translation that works across several dimensions of the socio-technical system and thereby catalyses a more profound change of niches and/or regimes. In paper III, we refer to the difference as the difference between thin and thick translation. This is closely associated with the distinction between incremental and radical socio-technical change.

2.3.4 Multilevel institutional change

Lastly, the research project addresses political implications of local environmental governance by investigating its role in contributing to institutional change beyond the local setting. Paper IV focuses on building energy performance requirements in local programmes in relation to other tiers of government. Such local environmental governance initiatives can be understood as part of a movement towards multilevel governance. The introduction of local policies, or institutions, may overlap with existing ones at higher tiers of government. This may cause friction and synergies,

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[25] Linking to the discussion on market barriers for energy efficiency, these market barriers may be interpreted as the institutional embeddedness of socio-technical systems.

[26] Translation may also serve to increase the incompatibility of niches and regimes, i.e. when perceived problems in the regime contribute to shaping niches that are different from regimes. Such translation is not addressed within the context of this research.

contributing to changes in institutional frameworks across different levels of government.

In order to address such mechanisms, paper IV combines polycentric perspectives on multilevel governance with recent work on gradual institutional change by Thelen and colleagues (Mahoney & Thelen, 2010b; Streeck & Thelen, 2005). Their work belongs to a vein of historical institutionalism developed within political science (see also Hall & Taylor, 1996; Lewis & Steinmo, 2012; Pierson, 2004). Such a perspective understands institutional change both as a product of rational individuals' response to exogenous change, and as endogenous, conditioned by existing institutions.

Mahoney and Thelen (2010b) present a typology of four different patterns of gradual institutional change: layering, displacement, drift, and conversion. Layering refers to the adding of institutions on top of existing ones, i.e., addressing the same issue. Displacement is the replacement of an existing institution with a new. Institutional drift is when an institution's function alters due to changes in its environment. Institutional conversion refers to the deliberate change of an institution to accommodate new goals, functions or purposes.

In paper IV, these patterns are used to analyse change in institutional architecture, i.e., the number and scope of regulatory building energy performance requirements, and institutional design, i.e. the formulation and function of these requirements. Layering and displacement represent the former, while drift and conversion represent the latter.

The different patterns of gradual change are related to each other in sequential ways (van der Heijden, 2014a). Local governance initiatives are likely to involve processes of institutional layering. However, this pattern of institutional change interacts with other patterns. In this sense, there is a built-in dynamic in multilevel governance.

In addition, change depends on change processes in the institution's environment such as technological change.

3 Methodology

The analytical frameworks outlined in the previous section were chosen based on their relevance for the governance initiative at hand and their ability to capture different types of outcomes of local environmental governance initiatives. As a result, this thesis engages with a broad set of analytical approaches and theories. In this chapter, the methodological implications of such an approach are discussed. The chapter also includes a presentation of the overarching research design and the methods for data collection and analysis.

3.1 An applied, interdisciplinary approach

This PhD project was conducted in a research setting characterised by an emphasis on societal relevance, interdisciplinarity, and collaboration with societal actors (in what Gibbons et al., 2010 denote as mode 2 knowledge). Interdisciplinarity, in this regard, refers to an openness in considering methods and theories from a broad range of research fields in order to address relevant research questions (Dalhammar, 2007; Jantsch, 1972; Repko, 2012). In addition to the benefit of societal relevance, research combining different theoretical bodies may provide important grounds for exploratory research as well as constructive critique and further development of existing theories (Repko, 2012). However, mode 2 research is also associated with challenges.

Two primary trade-offs in terms of research design are discussed here: the first relates to theoretical coherence. Operating in a mode 2-research environment means mediating between theory complexes, often with different metatheoretical assumptions such as regarding the natures of reality and knowledge. This can be beneficial in terms of a multidimensional conception of a problem area. As argued by Voß and Kemp (2006) the sustainability problem can be viewed as a problem of unintended side effects resulting from narrow disciplinary optimisation. But it also provides challenges in terms of coherence. This is discussed further in section 3.2.

The second trade-off relates to the object of research, i.e. the empirical focus. An empirical focus guided by societal relevance, as opposed to fitness for theory-building may imply a cost in terms of analytical leverage. This is further elaborated in section 3.3 in the discussion of case selection.

3.2 Metatheoretical considerations

Interdisciplinary research means negotiating between different metatheoretical perspectives. Traditional perspectives, such as positivism, critical theory or constructivism, in their pure interpretations inhibit interdisciplinarity to a large extent (Høyer & Næss, 2008; Lincoln & Guba, 2003). In line with Høyer and Næss (2008) I argue that environmental science requires interdisciplinarity, also across scientific paradigms. This interdisciplinary imperative of sustainability research requires a metatheoretical strategy, which allows for diversity while still guiding the research project and contributing to the validity of its results.

The position taken in this thesis can best be described as critical realism. This implies a pluralistic ontology of a multi-levelled reality to be researched, from the physical and biological to the cultural and normative (Bhaskar & Danermark, 2006). Indeed, in investigating environmental problem complexes, physical realities are central in the sense that it is through its physical and biological reflections that the problem at hand becomes defined as being environmental. Still, in relation to governance, socio-economic and cultural levels of reality are also central.

The aim of this PhD project is to look at the different ways through which local governance may foster change towards environmental sustainability. This specifically involves looking at these different levels of reality. For the empirical area of this research, such levels, for example, range from how policies impact the technological characteristics of specific buildings, to how they impact municipalities' institutional characteristics and the forms of knowledge embraced in the planning process.

Further, the perspective of critical realism emphasises the need to investigate processes at several levels of the human interaction scale, from the interpersonal to the global (Bhaskar & Danermark, 2006). This is highly relevant for the example of local environmental governance (Høyer & Næss, 2008). It is, for instance, reflected in the fact that this PhD project includes papers both on how local environmental governance impacts the institutional capacity at the local level (paper I), and on how local environmental governance is part of an interplay across different levels of government (paper IV).

In terms of epistemology, the PhD project reflects a view of knowledge as unavoidably coloured by the perspective of the researcher and the research context. Still, (in line with critical realism) the research is based on the search for validity and the belief that research can contribute to building provisional truth claims (Pawson, 2006). This is reflected, for instance, in the use of triangulation, i.e. combination of different methods (for data collection or analysis) for investigating the same phenomenon in order to reach stronger conclusions.

Just as the researcher cannot be fully objective, nor is there a clear distinction between policy analysis and governance (Lindblom, 1959). For example, the parameters chosen for assessing a policy will influence policy design and vice versa.

3.3 Research design

This thesis has largely employed a case study research design, and a policy evaluation framing. At the same time, the logics in terms of research design differ when looking at the specific studies of which this PhD project consists, and when looking at the aggregated PhD project. This distinction will be reflected in the following section.

3.3.1 Case studies

At the overarching level, this study adopts a case study research logic, meaning that it investigates a phenomenon within its context, it relies on several types of data sources, and data collection and analysis is guided by theory (Yin, 2009).

While the topic of the thesis is that of local environmental governance initiatives, the specific case is such initiatives in Swedish municipalities (and one Danish), addressing building energy efficiency in new buildings beyond the municipalities' own property. The primary basis for selecting the case was its policy relevance. From an international perspective, the policy relevance comes from Sweden's role as a forerunner. From a Swedish, national perspective, the policy relevance also lies in the research's ability to feed into a current policy debate of the authority of municipalities in carrying out local environmental governance.

Understanding the case's characteristics in relation to other cases is, however, also valuable in relation to giving analytical leverage to the results, thereby enhancing the thesis's research contribution. Somewhat simplified, the case can be understood as a critical case (Flyvbjerg, 2006). The case constitutes a critical case, both in terms of the geographical setting, and in terms of the policy area investigated. When it comes to the geographical focus, Sweden is particular in two ways. First, environmental governance in Sweden is generally described as ambitious and successful, particularly when it comes to energy-related governance and aspects of GHG mitigation (Germanwatch & Climate Action Network Europe, 2016; Hildingsson, 2014).

Simplified, the analytical leverage is then that, if we are to expect effective environmental policies anywhere, they will be in Sweden[27].

Second, Swedish municipalities are generally described as powerful. This is reflected in their power to levy income taxes, their role as providers of a large share of public services, their strong position in spatial planning processes, and many municipalities' strategic land ownership (Gustafsson, Ivner, & Palm, 2015; Kalbro, 2000; Kelly & Pollitt, 2011; Vedung, 1993; Wollmann, 2004). In this sense, if local governments are to take a leading role anywhere, it will be in Sweden. On the other hand, as argued by Rabe (2007), based on a comparison of Canada and the US, ambitious national regulation may inhibit local action. It should also be noted that when it comes to building energy performance, Swedish municipalities' formal authority is not comparatively strong.

The City of Malmö is the single municipality occurring in all four papers, therefore meriting some attention in terms of case selection. Also at this level, the case can be described as critical. The large size of the city, Sweden's third largest municipality, contributes to its likelihood of implementing effective and influential policies, given the economies of scale in local environmental governance initiatives. This resonates with Lee and Koski's (2015) findings regarding green buildings in US cities.

Another critical characteristic is Malmö's ongoing restructuring from an industrial to a knowledge-based city. The city's branding as green has been an important component of this restructuring (Anderberg & Clark, 2012; Dannestam, 2009), in common with some other post-industrial cities (see e.g. McKendry, 2013). The restructuring process may provide advantages as well as challenges in relation to proactive environmental governance. Advantages include the opportunity to reconfigure many of the city's material and social infrastructures, as these are destabilised. Challenges may include the need to engage with more urgent social challenges at the expense of long-term strategic work.

In terms of the policy area addressed, energy efficiency in new buildings represents an area that is associated with a large number of societal and private benefits. From a climate policy perspective, these can be referred to as co-benefits (i.e. benefits additional to GHG mitigation) (IEA, 2014; McKinsey & Company, 2008). Based on this, polycentric perspectives expect governance initiatives to be prevalent within this field (E. Ostrom, 2010). Indeed, Castán Broto and Bulkeley (2013) highlight building energy efficiency as a field where such initiatives[28] are particularly common. It is reasonable to believe that a policy area with a high level of co-benefits is also

[27] Paper III also includes a case from Denmark. That paper is referred to for a characterisation of the Danish case, but generally it is considered relatively similar to the Swedish case.

[28] Referred to as governance experiments.

likely to be characterised by a relatively high level of implementation. The implications in terms of additionality are more ambiguous, as the overlapping of initiatives may limit the influence of individual initiatives.

For the specific studies (I-IV), the relevant unit of analysis, and hence the research case, differs. In paper I, focus is on the local development projects in which a certain form of governing was applied. For paper II, the case is the City of Malmö and the various policy instruments in place there. Similarly to paper I, the case in paper III constituted the specific development project and the set of policy instruments in place there. Lastly, in paper IV, the unit of analysis constituted formal institutions in the sense of regulatory minimum energy performance requirements at various levels of government.

3.3.2 Policy evaluation

At an overarching level, the analytical logic of the research has been a logic of policy evaluation, in the sense of "the systematic application of social research procedures for assessing the conceptualization, design implementation, and utility" of public policy (Rossi & Freeman, 1989, p. 18). Despite the different units of analysis, all separate studies were guided by the aim to describe actual local environmental governance initiatives and analyse how (whether) they contribute to change towards environmental sustainability. The research represents a broad take on policy evaluation, not only addressing effectiveness but also attending to "higher order logics of social deliberation", including the addressing of issues such as the relevance of the policy to the problem situation and the relevance of policy goals to the society as a whole (Fischer, 2006). In particular, the overarching societal goal of environmental sustainability has been guiding the research in this regard. The results through which the governance initiatives may have contributed to addressing current environmental challenges are generally referred to as outcomes (cf. Scriven, 1991; Vedung, 1997). This thesis engages primarily with outcomes in socio-technical and institutional spheres (see section 2.2.4).

As outlined in Chapter 3, work on local environmental governance, polycentric governance and governance experiments guided the research in identifying such mechanisms. Indeed, the core of this work argues that the most important outcomes of local initiatives lie beyond their immediate target achievement. Still, the aim has been to substantiate this argumentation through the empirical investigation of these mechanisms. Seeking to investigate the mechanisms of polycentric governance implies going well beyond the methodology of the more traditional effectiveness evaluation. In this regard the research has been exploratory and interdisciplinary.

3.4 Methods for data collection and analysis

In societal relevance-driven research, the research problem is at the forefront and best available data sources are turned to in order to provide the best possible response to the research question. *Best* in this context means data as close to the phenomenon studied as possible, with as few middle hands as possible, i.e. natural rather than manufactured data (Rapley, 2004; Silverman, 2007). However, such data is seldom *available* when conducting societal relevance-driven research.

In order to strengthen the validity of the research, given these limitations, different methods for data collection have been triangulated. For example, in the study of the Constructive Dialogue in paper I, previous assessments of the dialogue were combined with interviews. The combination of different methods also served to give contextual understanding of the case (Yin, 2009). One study that somewhat breaks with the logic of triangulation is paper IV, which relies heavily on policy documents. The choice to make such a delimitation was based on scoping concerns and the limited accessibility of alternative data.

A particular trade-off concerning data availability was related to timing. Urban development processes are lengthy. For buildings, reliable data on measured energy use might not be available until several years after the planning, construction and associated governing processes. At the point in time when measurable data on building energy use is available, it is difficult to collect data on aspects of the development process, as this often relies on participants' memory and the sufficient archiving of documentation. Moreover, the policy relevance of the research findings decreases with time. Estimates of energy use earlier in the development process, on the other hand are problematic, as actual energy use often exceeds calculated energy use. This has been identified in several of the sustainability-oriented developments (BeBo, 2013; Nilsson, 2003), including Flagghusen, which was addressed in paper I (Energikontoret Skåne, WSP Environmental, & LTH Installationsteknik, 2010). In Malmö, the municipality provided building developers with support for improving the energy calculations. But the problem is still relevant.

This challenge of following up building energy performance was approached in different ways in the different papers. Paper I concerned a development further back in time and measurements of actual energy use for the buildings were available from literature. However, the long time lapse also meant that, in order to investigate aspects of the governance process and institutional outcomes, the research relied largely on secondary data, including previous interviews and participant observations.

In paper II, the research instead relied on calculated energy use as a proxy for building energy performance. It was assumed that the difference in calculated and actual energy performance was the same for those buildings covered by the local programme and those not. Energy calculations were therefore deemed useful for assessing the

programmes' effectiveness. The benefits of an early follow-up of the programme included better possibilities for data collection in the form of interviews and higher policy relevance of the results.

In the following section, the applied methods for data collection are listed, as well as the associated methods for data analysis[29].

Building documentation. This includes primarily the energy calculations of buildings in Malmö used for paper II, in all 33 energy calculations representing 1697 apartments[30]. These were analysed through descriptive statistics.

Policy documents. This data source includes legal material, policy programmes and associated preparatory work. Policy documents have been central in the framing of all studies. For example, goals have been guiding how to assess the policies. Paper III and, to an even greater extent, paper IV were more specifically based on the use of policy documents as a source of data. The analysis constituted of qualitative content analysis.

Interviews. Interviews have been used to a varying extent in all papers that are part of this PhD research. All together, the PhD project includes 49 interviews, of which 26 with representatives of building developers, 22 with municipal staff and 1 with a consultant. The interviews with building developers were structured, in order to enable quantitative analysis of the results. Interviews with members of municipal staff were semi-structured. To a great extent, the interviewees served as informants, that is, they were asked about factual matters when no data could be accessed to let a researcher observe the phenomenon directly. However, for certain aspects of the research, such as those relating to construction costs, the interviews have served to provide knowledge on the subjective experience of the interviewee. The interview material has been analysed both quantitatively and qualitatively. For paper II, interview data formed part of the descriptive statistical analysis.

Literature. In addition to providing input for framing the research, previous research and other reports have been used as data. In particular, paper I was framed as a form of meta-study, where the previous research on a specific type of policy initiative (the Constructive Dialogue) was used in order to compare and draw general conclusions. In this context, literature was used mainly as a secondary source of information.

Participant observation. During the PhD project, I participated in numerous meetings and industrial conferences, including,

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[29] The presentation does not include the data collected by my co-author Maj-Britt Quitzau in the case of Stenløse South, Egedal.

[30] In addition, the result of the energy calculation as reported in an interview was used for one building project. Therefore, the total number of apartments in the study is 1777.

- meetings arranged by the Swedish Association for Local Authorities and Regions, for municipalities seeking to foster energy efficiency in new buildings beyond its own buildings stock,
- the annual Green Building Conferences arranged by the Sweden Green Building Council,
- information meetings with Swedish National Board of Housing Building and Planning on the revision of the Building Code, and
- seminars for municipalities and building developers respectively, arranged at the research institute where this research was conducted – the International Institute for Industrial Environmental Economics at Lund University.

Observations and informal interviews at these meetings have been important in adding contextual understanding of the research and for guiding further data collection.

4 Key findings

This chapter provides a brief introduction to the individual papers, including the objective, framing and results.

4.1 Paper I: Experiences in urban governance for sustainability: The Constructive Dialogue in Swedish municipalities

4.1.1 Objective

The urban planning process is one important institution through which local governance is carried out. In recent decades, planning has been influenced by collaborative approaches as a form of network governance (see Healey, 1997; Innes & Booher, 2003). Moreover, planning has been applied increasingly with a rationale to enhance the environmental sustainability of built environments, also including the physical qualities of individual buildings. By relying on knowledge-building, persuasion and negotiation, collaborative planning approaches that seek to enhance environmental sustainability represent examples of enabling modes of governing.

The objective of paper I was to assess a set of such initiatives for sustainability-oriented collaborative planning in six Swedish municipalities during the period 2004-2009, carried out under the name the Constructive Dialogue. The Constructive Dialogue was introduced as part of a broader national initiative for a sustainable transformation of the construction and real estate sectors. The purpose of the Constructive Dialogue was to develop new methods for collaborative planning in the context of sustainability, based on the inclusion of a broad set of actors early in the planning process. In this sense, the initiative was experimental and the approaches developed differently in the different municipalities.

4.1.2 Framing

The analytical focus was developed on the basis of the aim to jointly address substantive environmental outcomes and institutional outcomes of these types of enabling modes of governing. In order to do this, the paper drew on the concept of institutional capacity in the meaning of "the capacity of urban governance to make a difference in sustaining and transforming the qualities of cities" (Magalhães et al., 2002). Based on previous studies of the Constructive Dialogue and on interviews, institutional capacity-building was analysed in terms of relationship-building, knowledge advancement and mobilisation. In terms of environmental outcome, paper I is broader than the other articles, not only focusing on building energy performance, but on the built environment more broadly.

In order to capture the different experiences of the dialogue processes, the article provides an overarching assessment of the Constructive Dialogue as implemented in the different municipalities, with a particular focus on Malmö. This means a broader geographical scope than papers II and III, and reflects the origin of the Constructive Dialogue in a national initiative.

4.1.3 Results

Generally, the dialogue processes in the different municipalities were successful in terms of enhancing relationship-building and knowledge advancement. This was perceived to contribute to smoother, more consensual urban development processes. Actors involved in the early dialogue included building developers, the general public, different national authorities, as well as different departments of the municipal administrations. Knowledge development included the assuming of new perspectives through the interaction with these different actors in the planning process, as well as the acquisition of new knowledge through participation in lectures and workshops. In this regard, the Constructive Dialogue contributed to institutional capacity-building.

However, in terms of mobilisation and the achievement of substantive environmental outcomes, the Constructive Dialogue was less successful. One of the impediments for mobilisation was the lack of a joint understanding of what sustainability actually entailed in the individual projects. In many of the dialogue processes, the environmental aspects were lost. This indicates a challenge in simultaneously attending to procedural and substantive aspects of local environmental governance.

In a few instances, the approach did manage to integrate a more substantive environmental sustainability focus. The clearest example was the Constructive Dialogue as implemented in the development of Flagghusen in the Western Harbour in Malmö. The approach in Flagghusen had a particular focus on building developers, and became known as the Developer Dialogue. By formulating a sustainability

agreement between building developer and the municipality early in the planning process, the environmental aspects were kept on the table throughout the process.

However, even in the Developer Dialogue in Malmö, where the collaborative approach did have a stronger substantive focus, environmental outcomes were limited. This was due to weaknesses in the targets set as well as to the implementation of these targets. The targets were weak in the sense that they were not particularly ambitious – for energy, they were closer to the national regulation at the time than to passive house levels – or not formulated in such a way as to achieve the overarching purpose. For example, green space factors unintentionally incentivised green roofs, rather than green space at ground level. The weaknesses in the targets set reflect a tension between the collaborative, consensus-oriented approach and the ambition to foster cutting-edge solutions for environmental sustainability. It relates to the tension between radical and incremental change.

In terms of the implementation and enforcement of these targets, it turned out that some building developers abandoned the sustainability agreement, arguing that their company standards fulfilled similar purposes. One example was the agreement in Malmö to minimise the use of toxic substances by using the Swedish BASTA database, which lists approved substances. Several participating building developers later refrained from using this database, with reference to the use of alternative systems for controlling harmful substances. In other cases targets were not reached due to ad hoc alterations throughout the construction process. This was, for example, one of the explanations for the poor energy performance as compared to the calculated and agreed levels of building energy use. This reflects the challenge in making local environmental governance strategies synergetic with companies' own standards and procedures. It also reflects the insufficiency of solely initial consensus in local environmental governance. The need for ensuring that initial consensus solutions hold throughout the process was also reflected in Constructive Dialogue processes in other municipalities.

Lastly, it was reflected in several of the participating municipalities that the method development through the Constructive Dialogue could not be seen in isolation, but that the methods developed through the Constructive Dialogue formed part of a development in the municipality. They built on previous initiatives and contributed with experiences to future governance initiatives.

4.2 Paper II: Assessing local governance experiments for building energy efficiency – the case of Malmö

4.2.1 Objective

Paper II addressed municipal programmes for building energy efficiency. The objective of this research was to respond to the research gap in terms of implementation and effectiveness of local environmental governance initiatives, by evaluating the outcome of the innovative governance approaches in one municipality, namely Malmö, for enhancing energy efficiency in new buildings. Of primary focus was the so-called MBP South, a programme including sustainability requirements for several environmental aspects. It allowed the choice between different ambition levels, A, B and C, of which C was the lowest mandatory, slightly better than national regulation. MBP South was based partly on the experiences from the sustainability agreement in the first Developer Dialogue in Malmö (addressed in paper I), and was a way of institutionalising and up-scaling these experiences. MBP South is an example of a municipal programme applying generally on all land sold or leased by the municipality, where the requirements become legally binding through their association with the land allocation agreement. These programmes represent a form of governing by authority.

Some buildings addressed by the study also formed part of a third development phase in the sustainability-oriented district of the Western Harbour (after Bo01 and Flagghusen), Fullriggaren. There, MBP South applied in combination with a Developer Dialogue process. For these buildings, a combination of authoritative and enabling modes of governing then applied.

4.2.2 Framing

In paper II the programmes with energy requirements on new buildings were framed as a form of governance experiment (Castán Broto & Bulkeley, 2013; Hoffmann, 2011). The concept governance experiment was used similarly to what in this thesis is referred to as local environmental governance initiative. This perspective was combined with a policy evaluation approach.

The study adopted a quasi-experimental research approach, analysing the outcome of MBP South, as additional to coexisting initiatives addressing building energy performance, such as building developers' own guidelines, or labelling schemes (Scriven, 1991; Vedung, 1997). In order to do this, all buildings in Malmö that received a building permit and initiated construction in 2010-2011 were studied. Buildings that were not subject to the programme were compared to those subject to

MBP South as well as the Developer Dialogue. The research focused on the energy efficiency-related aspects of MBP South. In addition to outcome, the study analysed the associated construction and operating costs. Interviews with project leaders for 34 development projects and the energy calculations for these projects constituted the primary data sources.

4.2.3 Results

The study found that the programme was implemented for all buildings on land owned by the municipality covering 62% of the apartments in multiresidential buildings constructed in Malmö during the time period studied. The dominating ambition level was B (see Figure 1). It was also found that the buildings not subject to Developer Dialogue committed to the C level only. A recurring justification for opting for the C level was that this would interfere least with the company's own guidelines for building energy performance. Similarly, for those opting for the B level, a justification for not committing to an A level was that this allowed for alternative approaches to building energy performance, other than the passive house criteria applying to the A level. In this sense, an advantage of the different ambition levels was that they allowed for a greater diversity in terms of technical solutions and company-specific standards.

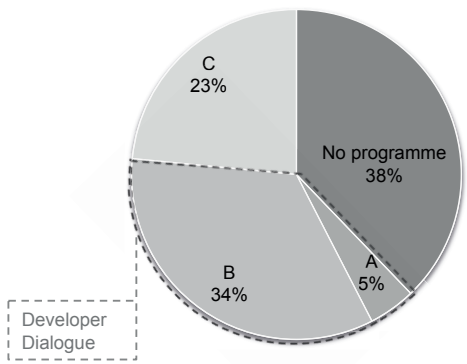

Figure 1 Applicability and ambition levels, MBP South
Note: Share according to number of apartments. C is the lowest ambition level, and the only mandatory. All apartments within the dotted lines were part of the Developer Dialogue and were located in the Western Harbour.
Source: Smedby (2016)

Further, the study found that the local programme's energy performance requirements were effective in terms of improving energy performance (as indicated by energy calculations) (see Figure 2). The programme also had a number of specific

technical requirements, including requirements on white goods, energy- and water-saving taps, the possibility of measuring energy for hot water separately, testing of air tightness and the level of air tightness. For these, effectiveness varied and some limitations in terms of implementation were identified. Still, the overall finding is that the programme was effective, which contradicts the view that local initiatives addressing global sustainability challenges are merely rhetorical.

For those buildings where the local programme was combined with dialogue-based modes of governing in the district Fullriggaren in the sustainability-oriented neighbourhood of the Western Harbour, the performance was higher. This indicates that a combination of different modes of governing is likely to be effective. However, the research design could not isolate the effects directly attributable to the dialogue process, and those attributable to the general sustainability profile of the Western Harbour. Indeed, interviews highlighted that this profile was important for aiming for high sustainability standards.

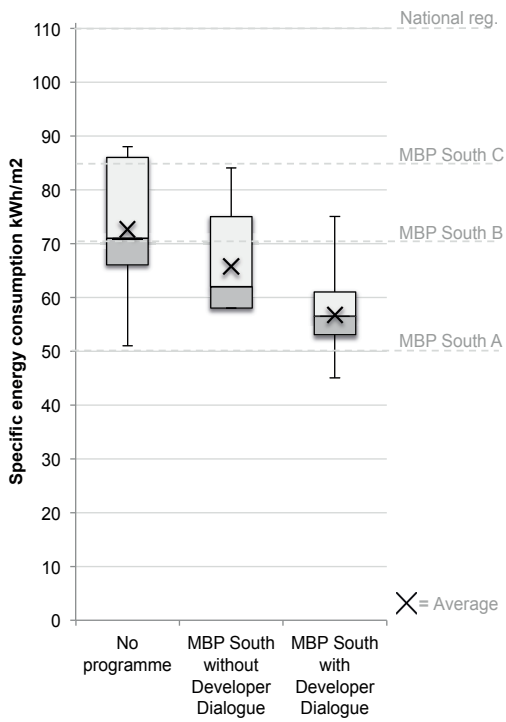

Figure 2 Outcome, specific energy consumption
Note: Box diagram with quartiles. Values refer to delivered energy for buildings as heated by district heating.
Source: Smedby (2016)

The cost assessments were based on the building developers' own estimates of the additional costs of the energy-related requirements, as compared to their standard building at the time. Generally, the building developers assessed the costs to be none

or small, and the few quantitative estimates of the additional costs given ranged between 0.03% (for buildings with ambition level C) and 2.25% (for buildings with ambition levels A or B). Several interviewees said that they would have built the same house were there no local requirements. This indicates that the energy requirements were cost-effective from the building developer's point of view. For building developers in Fullriggaren that were part of the Developer Dialogue, an important source for additional costs was administration.

In relation to operating costs, the lower energy costs were mentioned, but the difficulty in finding skilled staff for maintaining the low-energy buildings, which contributed to an increase in maintenance costs, was also highlighted in the interviews with building developers.

4.3 Paper III: Municipal governance and sustainability: The role of local governments in promoting transitions

4.3.1 Objective

Paper III started with the observation that municipalities have increasingly been addressing the aspect of mainstreaming of niche technologies in urban development projects. The objective was to strengthen the understanding of local environmental governance's role in these projects for catalysing socio-technical change in energy efficient construction. In order to do this, two examples of local governance for building energy efficiency were analysed in terms of modes of governing and the enabling of socio-technical translation. The study looked at two urban development projects, one in Malmö, Sweden and one in Egedal, Denmark. The development in Malmö was Fullriggaren, i.e. the urban development district subject to Developer Dialogue and MBP South in the Western Harbour, also addressed in paper II. The development in Egedal, called Stenløse South, was a development of single-family residential buildings. The two developments represented innovative approaches in environmental governing for building energy efficiency, implying roles as frontrunners.

4.3.2 Framing

In order to characterise the two cases, the study drew on work from the local environmental governance literature, including Bulkeley and Kern's (2006) modes of governing-typology (see section 2.2.3) and socio-technical transition literature. In the transition literature, it used the concept of translation (Boyer, 2015; Seyfang, 2010; Smith, 2007) for understanding municipalities' role in facilitating the mainstreaming of environmentally preferable socio-technical systems. As described in section 2.3.3, translation denotes the processes through which niches and regimes shape one another, including accommodation processes serving to enable the transition to a new regime. By facilitating the interaction of niches and regimes, translation can be catalysed. This can, for example, be done through projects including both actors representing mainstream construction and those representing innovative approaches to energy efficient construction, or by making regime actors engage with niche technologies.

In an inductive research design, the analysis was structured according to a number of translation entries. These translation entries constitute phases of the urban development process where governance has the opportunity to catalyse interaction of niches and regimes. The way in which this is done influences the type of translation taking place.

The study was based on a combination of methods for data collection, including interviews, document analysis and participant observation.

4.3.3 Results

The analysis pointed to important similarities between the two cases of local environmental governance, in spite of them being set in two different national contexts. Both municipalities addressed strategically the border area between niches and regimes, and the aspect of translation through the development of intermediary urban development projects. In Malmö, the development of Fullriggaren was described as follows:

> First came the eco villages, then came the spectacular demonstration projects such as Bo01 and Hammarby Sjöstad [31]. Now the third generation of sustainable urban development is planned for, in which sustainability becomes mainstream. (Malmö City, 2007)

[31] Bo01 was the sustainability-oriented city district in Malmö developed as a housing exhibition, further described in Chapter 1. Hammarby Sjöstad is a sustainability-oriented housing development in Stockholm, similar to Bo01.

The governance approaches in the two developments turned out to be a product of strategic choices as well as of local prerequisites. Both approaches involved a combination of different modes of governing: governing by authority, governing by enabling and governing by provision. Both municipalities relied on land ownership in order to set requirements on buildings' technical properties, such as energy performance, i.e. in order to govern by authority. This was combined with enabling modes of governing, including information, dialogue and external funding. Governing by (non-)provision was also important in shaping the translation in the two development projects, as reflected in the choice of whether to provide district heating or not.

In the two development processes it was shown how the enabling of translation requires pragmatism and active governance throughout the development process. In this process, incompatibilities between niches and regimes were revealed and new solutions negotiated. Sometimes, these required the renegotiation of agreements between building developers and the municipality. In this regard, the two processes highlight the particular role that local governments, as opposed to higher-tier governments, may play in enabling translation. Governance at the local level allows for a more interactive governance process[32].

The governing strategies in the two developments contributed to enabling socio-technical translation. A challenge remained, however, in motivating building developers to break with mainstream practices and embrace niche principles in a more holistic manner, i.e. translation remained thin (see section 2.3.3). For example, one building developer in Malmö chose to lower the ambition level when this proved to be in conflict with certain comfort features such as floor heating. With thin translation, change tends to be incremental, as opposed to radical. This highlights the tension between consensus and radical change.

The research also pointed to another dimension than thickness for describing translation, namely translation breadth. The two developments differed in this regard. While, in Stenløse South, focus was on making mainstream building developers adopt specific niche solutions, the governance strategy in Fullriggaren was to bring together a broad group of building developers representing both niche and regime approaches to energy efficient construction. Through their interaction in the Developer Dialogue, the compatibility of a broader range of alternative solutions was tested. One important aspect for allowing for such diversity was that developers could choose ambition level in terms of energy performance. This implies a trade-off between translation thickness and breadth.

[32] It holds traits of what van der Heijden (2009) describes as a facilitative enforcement style, which he argues to be effective in enforcing building regulation.

4.4 Paper IV: Local environmental governance initiatives and multilevel institutional change

4.4.1 Objective

Local environmental governance initiatives do not occur in an institutional vacuum, but are set in a multilevel governance context. Overlapping policy frameworks at national and supranational (EU) levels implies constraints as well as opportunities for leverage of local initiatives (Rohracher & Späth, 2013). The objective of this paper was to analyse the multilevel dynamics of local environmental governance initiatives in terms of policy change, by looking at the case of regulatory energy performance requirements on new buildings at local, Swedish national, and EU levels. For the local level, it focused particularly on the requirements as part of programmes for sustainable buildings in the three largest municipalities, Stockholm, Gothenburg and Malmö.

While the primary contribution of papers I-III is in the empirical investigation of the different types of outcome of the governance initiative, this paper's contribution is primarily analytical, i.e. to describe and explain a case by applying and adapting an analytical framework to the area of local environmental governance in a multilevel governance perspective. Still, in doing this, it addresses the outcomes of local environmental governance initiatives, namely the institutional outcomes beyond the target area of the initiative (c.f. Table 3, p. 23).

4.4.2 Framing

By turning to theories of gradual institutional change (Mahoney & Thelen, 2010a; Streeck & Thelen, 2005), the policy change processes at national and supranational levels shaping and being shaped by the local programmes for energy efficient buildings were analysed. The study both addressed changes in institutional architecture, i.e. the number and scope of energy performance requirements in place, and institutional design, i.e. the formulation and function of these requirements. A typology of patterns of institutional change was used: layering, displacement, drift, conversion, and exhaustion (Mahoney & Thelen, 2010a; Streeck & Thelen, 2005) (see further section 2.3.4). Layering, displacement and exhaustion refer to changes in institutional architecture, whereas drift and conversion refer to changes in institutional design.

The study was primarily based on document studies, including policy programmes and associated preparatory work, but also involved interviews and participant observation.

4.4.3 Results

The case illustrates an example where proactive local environmental governance is spurred by developments at other levels of government. Further, it shows how local initiatives have important implications for policy change at other levels of government.

While building energy performance has been regulated at the national level, local programmes arose with justification in local, national and EU environmental policies, and experiences from small-scale projects. These local programmes, as well as the introduction of the EU Directive for Building Energy performance (Directive 2002/91/EC), resulted in institutional layering in building energy performance. The design of the requirements at the various levels of government differed in terms of stringency and system boundaries. This could be explained by the fact that policymakers at local and EU levels assessed the technological progress as more advanced than policymakers at the national level. One example was with regard to the feasibility of the passive house concept. This discrepancy contributed to the introduction of local requirements for building energy performance that were sharper than the national ones.

The state of multiple institutional layers addressing building energy performance requirements proved to be unstable. Friction due to the multitude of, and differences between, the requirements at different levels led to measures from the national government's side to limit the ability of municipalities to set local energy performance requirements. The attempt was partly successful. At the same time, the national building code's energy performance requirements were revised in order to meet the critique in the shape of the local and EU policies. Changes to the national building code, which were justified by the local governance initiatives, included the introduction of a classification system for building energy performance and the raising of the level of the energy performance requirements.

As regards multilevel gradual institutional change, this can be described as a process that started with institutional drift due to perceived technological progress in energy efficient buildings. This type of institutional drift resulted in institutional layering. Layering brought about both learning and friction, which led to partial institutional exhaustion at the local level, and at the same time institutional conversion at the national level.

5 Concluding discussion

This section provides firstly a synthesis of the findings of the thesis, linking back to the initially posed research objective and questions. This is followed by a discussion on the implications for future research. In the final section, policy recommendations for various levels of government are distilled from the research findings.

5.1 Synthesis of findings

Responding to the overarching research objective of contributing to knowledge on the role of local governance initiatives in addressing current environmental challenges, the results indicate that these types of initiatives may have an important role to play. Through the development of governing strategies where different modes of governing are combined, local environmental governance initiatives have to some extent provided for change in socio-technical systems as well as institutional spheres, both within the specific target area of the policy and beyond this area (cf. Table 3, p. 23). However, challenges in achieving these outcomes were also identified.

Two research questions were outlined at the beginning of this thesis:

What are the outcomes of local governance initiatives for building energy efficiency in terms of change in socio-technical systems and institutions?

How are different modes of governing employed in order to bring about achieved outcomes?

In responding to the research questions, several overarching themes and arguments can be extracted, as outlined in this section.

5.1.1 Change in socio-technical systems, balancing between the incremental and the radical

The starting point for setting the level of local energy performance requirements is based partly on different logics than at the national level. National energy performance requirements have been largely justified by private economic cost-effectiveness rationales, given mainstream construction practices. For the local programmes, rationales included relative justifications, such as that energy

performance should be better than national regulation or that levels should be set according to best available technology (see paper IV). In addition, the EU Directive for Building Energy Performance's future requirement for all new buildings to be nearly zero energy buildings by the end of 2020 (Directive 2010/31/EU) motivated higher ambition levels at the local level. In the sustainability-oriented districts such as Flagghusen and Fullriggaren in Malmö, the energy performance levels of the buildings were also settled with a view to mainstream niche technologies in energy efficiency and sustainable construction.

One challenge included pushing mainstream building developers to break with current practices in order to achieve more radical change. Paper I illustrates the tension between consensus among a broader group of building developers, and the ability to foster radical change. Paper III includes examples of when building developers, who initially aimed for higher ambition levels, lowered these when these turned out to be incompatible with certain architectural or comfort features. Radical improvements might require changes along several dimensions of the socio-technical systems, such as the architectural or user-related dimensions, but this kind of thick translation was difficult to achieve.

On the other hand, the findings from paper III also point to a trade-off between an urban development process that fosters radical change according to one parameter, such as specific energy consumption, and a governance process that can inhibit a broader set of approaches to energy efficient construction. In paper III this is referred to as a trade-off between translation thickness and translation breadth. The flexible requirements, with different ambition levels, which were applied as part of MBP South, allowed for such flexibility and a diversity of different technological solutions. For example, this allowed for building projects with climatisation solutions based on natural ventilation, or solutions that combined a strong focus on architectural qualities with high performance in terms of environmental sustainability. In these processes, not only the mainstream approach to construction was negotiated in relation to more energy efficient alternatives, but the alternatives were also negotiated in relation to each other, potentially providing for more successful change of socio-technical systems. This highlights the potential role of promoting diversity in local environmental governance.

The trade-off in terms of consensus, translation breadth and translation thickness also relates to competing standards for energy efficient construction. Both in the Developer Dialogue in Flagghusen (paper I), and in MBP South that applied to a broader set of building projects (paper II), the municipalities' governance ambitions proved to collide with companies' internal guidelines. In Flagghusen, parts of the sustainability agreement were actually abandoned by the building developers, with reference to the companies' own guidelines fulfilling the same purpose. In MBP South, many of the building developers who opted for the lowest ambition level in the programme justified this by stating that they focused primarily on the companies' internal standards.

This would not be problematic given that the company standards were equally good. However, the findings in paper II – that the energy performance was higher in those projects subject to the local programmes than those not subject to any such programme – indicate that the industry's own standards are not at the level of those standards required or encouraged by the municipality (cf. Figure 2, p. 44).

5.1.2 Combining different modes of governing

The governing strategies were based on governing by authority, governing by enabling and governing by provision. An important result was that the combination of enabling and authoritative modes of governing was particularly effective in achieving socio-technical change. Governing by enabling is a highly context-dependent mode of governing and was shaped in relation to specific development projects. In Malmö, this was done under the concept of the Developer Dialogue, and it also constituted the most elaborate approach throughout the thesis research for explicitly fostering building energy efficiency through governing by enabling. But the research also included examples of enabling strategies in other Swedish municipalities (paper I) and in one Danish municipality (paper III). Important elements in the Developer Dialogue included the enabling of collaboration among a diverse group of building developers, participants' commitment through a sustainability agreement, and the mobilisation around an application for a national grant for covering parts of the additional costs of the sustainability-related measures.

However, the research indicated that governing by enabling was insufficient on its own. For achieving change in socio-technical systems, the most effective governance strategies involved governing by enabling as well as governing by authority. In the later Developer Dialogues, for example, building developers had to commit to a certain ambition level that subsequently became legally binding through the land allocation agreement. In addition to being an important complement to enabling modes of governing, governing by authority provided the possibility to take a broader approach to energy efficient construction, not only confined to certain sustainability-oriented districts.

The recent alterations in Swedish municipalities' authority to set energy requirements through land allocation agreements, which some have interpreted as a banning of this practice (SALAR, 2013), means that the opportunities for combining different modes of governing in this way are circumscribed (see paper IV).

5.1.3 Governing throughout the urban development process

In addition to the importance of combining different modes of governing to allow the governance strategies to be effective, the research also pointed to the importance of a strong consolidation of agreed targets and active governance throughout the entire urban development process. In paper I, initial consensus was abandoned later in the development process in several of the Constructive Dialogue processes. One example was the agreement in Malmö to minimise the use of toxic substances by using the Swedish BASTA database, which lists approved substances. Several building developers later refrained from using this database, with reference to the use of alternative systems for controlling harmful substances. Moreover, the agreed energy performance levels were not reached. This could be explained by the changing of designs after energy calculations had been made. The agreement could have been better maintained if it had been better consolidated throughout the participating organisations earlier on in the process, and if better follow-up throughout the development process had been ensured.

In paper II, the implementation of some of the more specific technical requirements in MBP South was not followed up at all, but building developers were trusted to fulfil them. The assessment performed as part of this research project shows mixed results for these requirements. Some of the requirements were difficult to follow up due to their poor specification.

In paper III, the results indicate challenges in implementing the required low-energy technologies in the development Stenløse South. However, paper III also offers an alternative interpretation of these implementation problems. From a translation perspective, these problems can be seen as forming part of the mutual learning process of adopting new socio-technical systems and are therefore partly unforeseeable. This learning process involved building developers as well as the municipal administration. In order for the development process to enable such translation, strategic governance throughout the development process is required, as was the case in the two intermediary development projects studied. In Stenløse South, for example, when new knowledge developed concerning new technologies' compatibility with existing socio-technical systems, the agreement between the homeowners and the municipality was renegotiated.

5.1.4 Costs and building energy performance

Paper II addressed the cost aspect of building in accordance with higher energy performance standards. A common critique of the local governance initiatives for building energy performance in Sweden is that they contribute to increasing construction costs (Attefall, 2011; SOU 2012:86). Paper II looked at the additional costs for following the energy performance levels (A, B or C) committed to in MBP

South, as compared to what developers would have built otherwise. As described in section 4.2, these were assessed to be small or non-existent. An important reason for this is the decrease in operating costs associated with higher energy efficiency, which makes it cost-effective from the building developers' perspective to construct with better energy performance than required by national regulation.

For building developers in Fullriggaren, which were part of the Developer Dialogue, a significant reason for additional costs was administration (paper II). Similarly, in the assessment of the first Constructive Dialogue (paper I), the time input from others than municipal administration was identified as a limitation for up-scaling of this form of governing by enabling[33].

5.1.5 Governance initiatives build on each other

A recurring feature in the results from the Swedish municipalities was that individual governance initiatives, such as the strategic work in a sustainability-oriented district, or the introduction of a programme for energy efficient buildings, were part of a sequence of different events and initiatives. Several of the planners involved in the Constructive Dialogues witnessed that the projects within this process were part of a longer series of method development for better planning processes (paper I).

The relationship between different initiatives in a municipality also became clear by following the development of governance approaches in Malmö through all the papers. The series of initiatives provided for policy learning as well as for the building of a sustainability brand and institutional capacity, which enabled mobilisation around sustainability issues.

In terms of policy learning, the Constructive Dialogue in Fullriggaren was an opportunity to develop the methods for dialogue with building developers as initiated with the sustainability-oriented housing exhibition in Bo01. The experiences from Bo01 and Flagghusen pointed to the need to strengthen the possibility to enforce agreed targets, and also contributed to the municipality's wish to institutionalise the processes for governing and spread the experiences from the early developments in the Western Harbour. This provided the background to MBP South, which applied more broadly (paper II and IV) and the continued work with the Developer Dialogues (paper II and III).

As regard branding and institutional capacity building, the series of environmentally-oriented urban developments in the Western Harbour, starting with the Bo01

[33] On the other hand, the municipality has also been asked by building developers to carry out Developer Dialogues on privately owned land. This indicates that the costs for participating, e.g. in terms of time input, are outweighed by the benefits, which may include learning and branding.

housing fair and followed by Flagghusen (paper I) and Fullriggaren (papers II and III)[34], contributed to the development of an area with a strong brand in terms of sustainability. Interviews indicated that this sustainability brand was important for raising sustainability ambitions (paper II). The importance of long-term strategic considerations in municipalities' sustainability efforts is thus highlighted.

5.1.6 Vertical institutional interplay

The cumulative effects of local governance initiatives for energy efficient construction also lead to outcomes in terms of policy, or institutional, change across different levels of government as shown in paper IV. The institutionalisation of local governance initiatives for building energy performance took the form of local programmes with energy performance requirements on buildings. These influenced the national building code's regulation of building energy performance, both through processes of policy learning and through institutional competition.

Despite local initiatives having been partly encouraged and sanctioned at the national level, e.g. through the introduction of the Constructive Dialogue and through the grants for furthering sustainability ambitions in sustainability-oriented districts in the Western Harbour, the friction between local programmes for building energy efficiency and national building codes led to the introduction of a law with the aim of limiting municipalities' authority in terms of setting energy performance requirements. There was thus a negative feedback loop, which challenged the sustaining of local initiatives. At the same time, a revision, including the sharpening of the national building code, was also performed with reference to the local requirements. In this sense, the local initiative contributed to pushing national ambitions.

5.2 Implications for future research

As described above, the research provides empirical examples of several of the outcomes through which local environmental governance initiatives have been argued to contribute to addressing current environmental challenges in the field of building energy efficiency. In this regard, the results support polycentric governance research's analysis of the governance of current environmental challenges. However, they also point to some of the challenges involved, including implementation deficits, a

[34] It has also been followed by other sustainability-oriented districts in the area, those on land owned by the municipality as well as those developed on private land.

challenge in mobilising diverse actors in order to achieve radical change, and power struggles between different levels of government. If such challenges are not taken seriously, local initiatives may even become counterproductive in addressing current environmental challenges.

5.2.1 An effective polycentric environmental governance?

In relation to outcomes in socio-technical systems, the research findings challenge the prediction that local governance initiatives are merely rhetoric (Brennan, 2009) and supports the notion that polycentric governance structures may occur (E. Ostrom, 2010), also in terms of effective governance initiatives. While the study of Malmö's first Developer Dialogue indicated problems in reaching agreed targets (paper I), paper II explored the additionality of local initiatives and showed that the more recent initiatives for enhancing building energy efficiency in Malmö did make a difference in terms of building energy performance. This means that carefully designed governance approaches are required in order to achieve this change.

The high share of co-benefits in the field of building energy efficiency or, in other words, building energy efficiency's relevance to a broad array of collective action problems, limits the possibility to generalise to other policy areas and hence to assess the feasibility of a more fully encompassing polycentric governance structure. The high prevalence of low-cost options for enhancing building energy performance further limits the ability to generalise from the findings.

In terms of supporting broader socio-technical change, paper III argues that local governance initiatives may play an important role in enabling translation through intermediate projects where niches and regimes interact. For example, Malmö's approach in the Developer Dialogues, where both niche and regime actors were involved in the same urban development project and their interaction was facilitated, provided for translation in which the compatibility of niches and regimes was tested and enhanced. Indeed, the contextualised, pragmatic governing taking place in urban development projects seems particularly fruitful for enabling translation. The findings confirm previous research on socio-technical translation (Boyer, 2015; Smith, 2007).

The most important outcomes in assessing local environmental governance initiatives may, however, be institutional (Jordan et al., 2015; E. Ostrom, 2010). From this perspective, the limited goal achievement in Malmö's first Developer Dialogue is problematic, not only because of the forgone opportunities to improve socio-technical systems. The insufficient implementation also risks undermining the trust-building function of governance initiatives in polycentric governance (a function that was particularly emphasised by E. Ostrom, 2010). However, the undermining of trust is partly contradicted by the results from paper I, showing that the Constructive Dialogue was largely successful in achieving relation-building and knowledge development. Moreover, the experiences from Malmö show that there was a

willingness from the municipality's side to learn from deficiencies in the Constructive Dialogue, and subsequent governance initiatives were designed in order to be more effective. This resonates well with Lenhart et al.'s (2014) description of Malmö municipality as a learning organisation.

While Malmö might seem a particularly beneficial setting for local environmental governance, it should be noted that this has not always been the case. The current sustainability profile has been acquired through long-term strategic work (Anderberg, 2009; Dannestam, 2009). In this sense, the results are valid for a broader array of cities, in particular restructuring European post-industrial cities.

Looking beyond the local level, paper IV engaged with the interaction of local governance initiatives with higher governance levels. It showed how the local governance initiatives for building energy efficiency provided synergies and friction, which contributed to change in national level policies, but also provided negative feedbacks, undermining municipalities' future authority in terms of governing building energy efficiency. This confirms previous research underlining institutional outcomes beyond the local setting as being central for understanding the role of local environmental governance (Engel & Saleska, 2005; Hoffmann, 2011; Sovacool & Brown, 2009). It also underlines the importance of addressing such change when assessing the outcomes of local environmental governance.

This thesis has primarily addressed multilevel institutional change in relation to building energy efficiency. However, the results also pointed to an important power dimension to these initiatives, in relation to the distribution of power between different levels of government. This points to the importance of analysing local environmental governance initiatives as politics of scale, where the governance initiatives may aim to strengthen local governments' power more generally. This has been beyond the scope of the thesis but is an important area for future research.

5.2.2 Local environmental governance and sustainability transitions

While prescriptive governance research streams, such as strategic niche management and transition management (Kemp & Loorbach, 2006; Kemp et al., 1998; Schot & Geels, 2008), emphasise the role of learning, networking and vision-building, as well as the building of increasingly broader coalitions for change for enabling sustainability transitions, the research here shows how many of these mechanisms are actually catered for through local environmental governance initiatives. The experiences in Malmö are illustrative in this regard. In the development of sustainability-profiled developments, such as Bo01 or Fullriggaren in Malmö, visions were built and a broad array of actors were brought together to learn from each other and formulate common goals. Step by step, with an increasing number of sustainability-profiled areas, and the introduction of a general programme for energy efficient and sustainable buildings covering the whole city (MBP South), knowledge development

takes place and the coalition of actors endorsing the sustainability-orientation of the city is broadened. The spontaneously evolving governance in cities, which relies on existing driving forces for change, may in this regard be more promising than the managerial fostering of such "experimentation" through different types of transition management.

5.2.3 Assessing local initiatives as part of polycentric governance

Evaluation is crucial for ensuring that local environmental governance initiatives can be part of effective polycentric governance. Nevertheless, for many of these initiatives, evaluation is still lacking. And when it comes to the mechanisms through which they provide a lever for broader change, research frameworks need to be developed to operationalise empirical investigation. In this regard, this thesis provides a contribution on which to build, both by further developing the proposed frameworks, and by developing frameworks for assessing a broader range of the mechanisms at play.

The assessment of local environmental governance holds both methodological opportunities and challenges, as compared to the assessment of policy instruments at higher tiers of government. A particular advantage, in terms of evaluability and associated opportunities for policy learning, is that these initiatives often take the form of natural experiments, lending themselves well for comparison and policy learning. This is also emphasised in polycentric governance perspectives as one of the advantages of such initiatives (E. Ostrom, 2012; Sovacool & Brown, 2009). It is particularly relevant for evaluating substantive outcomes of an initiative, such as changes in socio-technical systems. Still, as shown in paper III, many of these governing practices are highly context-dependent, and are shaped throughout the governing process. This context-dependence ought to be greater at the local level as compared to higher levels of government, since the local level is likely to involve a high degree of ad hoc interaction between policy makers and those subject to the governing strategies (as reflected in paper II and III). Also, as underlined by van der Heijden (2014b), proactive governance initiatives tend to take place in non-representative settings. This means that a variance-based research strategy is insufficient and the transfer of policy experiences needs to acknowledge the specific contextual interaction at play within each governing process.

The analytical approaches in papers I, III and IV, have followed an inductive research logic, where initial interpretations of the cases have guided the choice and development of theoretical perspectives. This resulted in a set of frameworks adapted to the assessment of local environmental governance in a polycentric governance perspective, beyond the immediate effectiveness. First, the research highlights institutional capacity building as a concept for bridging between substantive and institutional outcomes at the local level. Second, it underlines the relevance of the

concept of translation for analysing initiatives' potential to contribute to broader socio-technical change. It highlights translation thickness as well as translation breadth in this regard. Third, the research presents an analytical approach for engaging with the institutional dynamics of the multilevel change processes associated with local environmental governance, namely as patterns of gradual institutional change. In particular, the research showed how these different patterns fed into one another and thereby shaped the development at different levels of government. This points to the built in dynamic in processes of multilevel governance.

The inductive research approach also means that the choice of outcomes addressed reflects an initial assessment of what is deemed important. This means that the largely positive findings may not be representative for other mechanisms at play. Instead, the choice of mechanisms addressed, including institutional capacity-building, translation and multilevel institutional change, reflects part of the research findings, i.e. that these mechanisms are deemed important.

The research has largely adopted a case study methodology, focusing on specific governance initiatives in a few municipalities. It has addressed critical cases where local initiatives were relatively likely to occur and relatively likely to be effective. Therefore, the research primarily serves an exploratory purpose. This means that it provides knowledge on how these initiatives *may* contribute to addressing current environmental challenges but it does not capture the overarching patterns of practices and outcomes of local governance initiatives. Future research could build further on this by taking a complementary empirical approach both in terms of policy area and geographical setting.

5.3 Policy recommendations

The research in this thesis provides for policy recommendations both for the local level and for higher levels of government. These are summarised in Table 4. Generally, the findings encourage the development of local environmental governance initiatives, arguing that they hold particular advantages for addressing current environmental challenges. For example, urban development projects appear to be fruitful settings for enabling the mainstreaming of novel technologies, or socio-technical translation. However, the research also highlights the risk for counterproductive outcomes. For example, if policies are not properly implemented, they may undermine trust or foster counter-coalitions. Therefore, careful policy design, matching the resources set aside, is important.

In terms of policy design and governance strategies at the local level, the results highlight the importance of combining different modes of governing, such as governing by authority, governing by enabling and governing by provision, in

fostering building energy performance in new buildings[35]. It further highlights the need to ensure active governance throughout the urban development process in order to achieve the set targets and facilitate a mutual learning process.

Table 4 Policy recommendations

Actor	Issue	Recommendation
Local governments	Ensure effectiveness and foster radical change	• Combine different modes of governing • Govern actively throughout the development process • Build on previous experience • Engage a diversity of actors, representing both mainstream approaches and radical novelties
	Enhance political feasibility	• Attend to enabling modes of governing • Align requirements with company standards
Higher levels of government	Reap the benefits of local initiatives and avoid perverse effects	• Consider the role of local frontrunners in policy design, through forward-looking requirements • Consider local initiatives when formulating future scenarios and associated policy measures

In addition, synergies between different projects can be exploited beneficially. In the example of Malmö, it is clear that the different initiatives in the city build on each other. This has contributed to the creation of a strong community in terms of sustainable buildings, and it has also served to improve policy design over time.

However, local policymakers should also be aware of the power struggles at play when raising their ambitions in terms of sustainability. One basis of resistance may be the consequences of institutional fragmentation if local governance initiatives are not aligned with national level policies in the same area. Using existing standards or labelling schemes for buildings applied by mainstream building developers may be important for inhibiting fragmentation and thereby fostering broader coalitions that support the local environmental ambitions.

For the higher levels of government, the results emphasise the need for institutional designs that can capture the benefits of forerunners in order to enable transformative change towards environmental sustainability. One example could be to introduce

[35] The research did not address the cost-effectiveness of the governance approaches. Enabling governing approaches are often resource intensive and might therefore have limited cost-effectiveness. Hence, such approaches might not be feasible on a large scale.

forward-looking requirements at the national level, e.g. energy requirements in the national building code that municipalities could introduce before they became nationally applicable. Such requirements would be likely to render support from industry and may accelerate socio-technical change.

It should be underlined that, even if this research points to polycentric governance as being able to bring environmental governance further, local initiatives are certainly not a panacea (Jordan et al., 2015; E. Ostrom, 2010). In order to achieve synergies and avoid perverse effects, policies at national and supranational levels should take local governance initiatives into account, for example in the development of scenarios on which overarching policy measures are based. A dynamic co-existence of local, national and supranational governance seems the best fitted to overcome the dilemmas in current environmental governance in a politically feasible way.

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Cities appear to drive the environmental sustainability agenda to an increasing extent. While local environmental governance has traditionally been about implementing higher level policies, or carrying out municipal tasks such as spatial planning or the provision of municipal services, local politicians and civil servants are increasingly pushing environmental agendas. One example is in the climate and energy area, where local governments often set higher targets regarding greenhouse gas emission reductions, and transformation of the energy system, than at the national level. But can the initiatives of cities make any difference when it comes to solving the urgent global environmental challenges?

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