Homeowner responses to climate change
A sociological approach to climate adaptation of private homes
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Publication date:
2015

Document Version
Artiklen som den fremstår med udgiverens layout. Også kaldet Forlagets PDF

Link to publication

Citation for published version (APA):
PhD thesis, 2015:
Homeowner responses to climate change: A sociological study of climate change adaptation of private homes
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The research was funded by Norden Top-level Research Initiative sub-programme ‘Effect Studies and Adaptation to Climate Change’ through the Nordic Centre of Excellence for Strategic Adaptation Research (NORD-STAR), project no 36780.
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Acknowledgments

Undertaking this PhD project has been a great adventure. This is especially because of all the inspiring, fun and warm-hearted people I would not have otherwise met. This thesis is therefore dedicated to all of you.

To my main supervisor Lars Kjerulf Petersen for continual support, patience, valuable discussions and inspiring feedback – and many good laughs. And to my co-supervisor Helle Ørsted Nielsen for stepping in when I desperately needed her.

To the two most important people concerning my happiness and work satisfaction during these three years of PhD preparation; my office mates Jihyun Lee and Michele Seghetta. I don’t dare to think how PhD life would have been without you. And to all the rest of you fun and great people here at the Department at Environmental Science, for mental support, beers and lots of cake.

To the people at the Department of Interdisciplinary Studies of Culture at NTNU Trondheim for letting me not only into your academic but also your social lives. Thanks for taking me skiing, hiking and in general showing me beautiful Norway – in rain and sunshine. And for showing me that academic environments where environmental sociology jokes are told over lunch exist. I would have stayed longer if I could.

To all my fellow NORD-STAR PhD students and the rest of the NORD-STAR team. You have been like long-distance classmates and colleagues to me. Being part of NORDSTAR has made me feel that my project is a part of something larger. Spending time with you all at meetings, courses and conferences has always sent me home with new inspiration. I really hope to run into you all again.

Finally I would also like to thank the most important people in my life always; my family and friends. Thanks for coping with me, especially here during the last phase of the thesis. Thanks for letting me be a bit more hysterical and lazy than usual. I will make it up to you again in the near future I hope.
English summary

This PhD project focuses on how homeowners can and do respond to climate change. The focus is on how private homes can be adapted to a future where extreme weather events will be more normal. The main interest has been to study how homeowners perceive their own lives, their properties and their local area in relation to the effects of climate change and what makes them adapt their homes to climate changes? A second area of interest has been on a more general level to study if climate change and climate change policies affect the transitions that take place in private homes.

The study builds on two qualitative case studies in Denmark. In Denmark, the greatest concern related to the effects of climate change is increased flood risk, both from rising sea level as well as more and heavier rainfall. Therefore, the cases chosen were areas where flood risk is a central concern. The first case was single-family homes on Lolland. The second a housing cooperative in Copenhagen. Both Lolland and Copenhagen have experienced floods during recent years and are also designated to be especially vulnerable in relation to future climate change. They therefore provide interesting cases.

Three different theoretical approaches have been applied to understand and explore responses of homeowners in these two rather different cases. With Tim Ingold’s dwelling perspective a special focus has been on how everyday experiences with local landscapes shape perceptions of personal risk related to climate change, and thereby interest in taking measures to adapt to climate change. With the perspective of practice theory, especially as presented by Elizabeth Shove, the extent to which repairs, maintenance and refurbishment can be understood as a practice has been studied. Finally, Bruno Latour’s actor-network theory, together with its further development in the perspective of urban green assemblages, has provided a special sensibility towards the role of non-human actors. In this study, these non-human actors especially water-managing technologies such as pumping stations, dikes, sewerage systems and various kinds of local rainwater handling technologies e.g. soakaways, rainwater beds, and systems to collect and use rainwater.

The analysis in this study is presented in the three articles that constitute the last part of this thesis. The first article, “Climate change or variable weather: rethinking Danish homeowners’ perceptions of floods and climate” builds on the Lolland case study and focuses on how local landscapes, weather and different water-managing technologies such as pumps and dikes shape how
homeowners’ perceptions and actions relate to climate change. The second article, “The practice of dwelling and the nature of decision making: A practice theoretical approach to maintenance, refurbishment and reparation of private homes in the context of climate change” develops the theoretical concept of the ‘practice of dwelling’. The article discusses the efficiency of most present climate change policies aimed at private homeowners, and argues for the potential in expanding the focus from just decisions relating to large refurbishment projects to include the whole practice of keeping a house in repair. The final article, “Understanding controversies in urban climate change adaptation: A case study of the role of homeowners in the process of climate change adaptation in Copenhagen” builds on the Copenhagen case study and focuses on the controversies that exist surrounding urban climate change adaptation and how these shape the role of homeowners in the process of adapting Copenhagen to climate change.

In conclusion, my findings from the project fall into two main categories. The first is how climate change and climate change risk are perceived by the homeowners, and how this perception is connected to their actions. I have found that both personal experience with single weather events and long-term dwelling in a landscape are important; this mediated by different types of water-managing technology. The second is how we, on a more general level, can understand the actions of homeowners concerning their properties. With the concept of the ‘practice of dwelling’ I argue how feelings or knowledge about a future climate risk do not necessarily translate into concrete adaptation actions. A central reason for this is that in a ‘practice of dwelling’ homeowners keep on doing what they always have done, not because they have especially decided to do so but because they have not had sufficient time, energy or interest to change the practice. As climate change in most cases is a new issue for consideration, it often does not manage to influence the ongoing practice of dwelling.

By combining these two types of insight this study has contributed with new knowledge on when and how homeowners take climate change into account when they invest time and money in their properties. Furthermore, this study feeds into the ongoing development of practice theory in a way that can also be useful for environmental sociologists working with issues other than homeowner responses to climate change. Finally, I hope that the various findings from this study can contribute to the political work to assist private homes in the northern countries to become more resilient to a climate with more extreme weather events.
Dansk resumé

I denne ph.d.-afhandling undersøges det, hvordan boligejere forstår og handler som reaktion på klimaforandringerne. Formålet er at få bedre forståelse for, hvordan private boliger kan tilpasses til et fremtidigt klima med mere ekstremt vejr. Studiet undersøger: (1) hvordan boligejere forstår deres dagligliv, bolig og lokalområde i relation til mulige konsekvenser af klimaforandringerne. (2) Hvad der får boligejere til at klimatilpasse deres bolig og (3) om klimaforandringerne og forskellige klimaforandringspolitikker, på et mere generelt plan, har indflydelse på, hvilke forandringer der sker med private boliger.

Studiet bygger på to kvalitative casestudier i Danmark. I Danmark forventes klimaforandringerne at betyde flere og kraftigere regnskyl, flere storme og et stigende havniveau. Oversvømmelser er derfor den største bekymring relateret til et ændret klima. Dette har været styrende for valg af cases. Den første case vedrører en familiehuse på Lolland, den anden case vedrører en andelsboligforening i København. Både Lolland og København har oplevet oversvømmelser i løbet af de sidste år og begge steder bliver yderligere set som specielt udsatte i forhold til kommende klimaforandringer. Boligejere på de to lokaliteter udgør derfor interessante cases til at forstå, hvordan klimaforandringer kan have indflydelse på, hvorledes private hjem vedligeholdes og forbedres.

Tre forskellige teoretiske perspektiver er brugt til at undersøge og forstå boligejeres reaktioner på klimaforandringerne. Tim Ingolds perspektiv på hvordan mennesker beboer landskaber, har bidraget med indsigt i, hvordan boligejernes hverdagsoplevelser med vind, vejr og vand i deres lokale landskaber er med til at skabe deres forståelse af og reaktioner på klimaforandringerne. Ved hjælp af praksisteori, her specielt repræsenteret af Elizabeth Shove, er det blevet analyseret til hvilken grad reparationer, vedligehold og renoveringer kan blive forstået som en praksis. Afsluttende har Bruno Latour’s Aktør-netværks Teori, sammen med dens videreudvikling til perspektivet i ‘urbane grønne samlinger’ (urban green assemblages), bidraget med et fokus på at inddrage non-humane aktører. Her er en særlig interesse blevet tildelt teknologier til at håndtere vand såsom diger, pumpestationer, kloaksystemer, foruden forskellige LAR teknologier (Lokal Afledning af Regnvand) såsom; faskiner, regnbede og regnvandsopsamlinger.

Den detaljerede analyse i dette studie er presenteret i de tre artikler der udgør anden halvdel af denne afhandling. Den første artikel, “Climate change or variable weather: rethinking Danish

De sammenfattende konklusioner i denne afhandling falder i to kategorier. Den første omhandler, hvordan klimaforandringerne og deres konsekvenser bliver forstået og reageret på af boligejerne. Her vises, at personlige oplevelser med både enkelte vejrbegivenheder, så vel som den længerevarende beboelses i et landskab, er centrale forklaringsfaktorer. Yderligere spiller forskellige teknologier til at håndtere både hav- og regnvand en væsentlig rolle. Den anden konklusion centrer omkring, hvordan man på et mere generelt plan kan forstå, hvad der driver boligejeres handlinger i forhold til deres huse. Med begrebet ”beboelsespraksis” argumenteres der for, hvordan en føgelse af eller viden om en fremtidig klimarisiko, ikke nødvendigvis udmonter sig i konkrete handlinger. En central grund er, at beboelsespraksisser bygger på tidligere erfaringer og socialt overført knowhow og viden. Som resultat bliver boligejerne ofte ved at gøre, som de altid har gjort, ikke fordi de har taget en speciel beslutning om at gøre det, men fordi ændringer af den kendte praksis tager tid, energi og interesse. Klimaforandringerne er for de fleste et nyt fænomen, de ikke har skænket mange tanker og derfor formår klimaforandringerne ofte ikke at ændre de nuværende beboelsespraksisser.

Ved at kombinere disse to indsigter i boligejeres forståelser og handlinger har denne afhandling bidraget med ny viden om, hvornår og hvordan boligejere inddrage klimaforandringerne, når de investerer tid og penge i deres huse. Yderligere bidrager afhandlingen til en videreudvikling af det praksistheoretiske perspektiv, der også kan være nyttigt for miljøsociologer, der arbejder med andre
emner end klimatilpasning og boligejere. Afsluttende er håbet at konklusionerne fra dette studie kan bidrage til det politiske arbejde med at gøre private hjem i den nordlige del af verden bedre tilpassede til et klima med mere ekstremt vejr end i dag.
PART I: Presentation of the project
Introduction

In this PhD project I look at how Danish homeowners can and do respond to climate change. My focus is on how private homes can be adapted to a future climate where extreme weather events become more frequent. As an environmental sociologist, my interest has been to study how homeowners perceive climate change and if climate change can be seen to be reflected in their actions.

During recent years there has been steadily growing attention and concern directed towards climate change. Up to around five years ago the main focus was on how we could mitigate climate change, at least in the northern part of the world. However, lately the debate has extended also to include adaptation to the climate changes that are now broadly believed to be take place irrespective of mitigation efforts. In the first months of this study, in January 2012, I attended an adaptation seminar in Copenhagen. Here, I experienced several people question the adaptation focus of my project when I told them that I was looking at homeowners in Denmark. Their argument was that climate change will have such a small effect in Denmark that to study adaption seemed irrelevant. Instead, they argued that if I was interested in adaptation I should rather focus on people for whom climate change will prove a real problem, such as the people in Bangladesh, the Sami communities in northern Scandinavia, or the farmers in some of the large areas all over the world where drought is a growing threat. I expect that the response to my project from the same people would be different if I met them today. While this PhD project has been underway, climate change adaptation has become a much more debated issue and there is now widespread agreement that also in the northern part of the world there is a need for measures to adapt to a future with more extreme weather. This change of perspective has in Denmark been further motivated and supported by several damaging cloudburst events and storm surges that have hit the country over the last few years. These weather events have created large floods and have thereby illustrated the vulnerability of the country, as well as being seen as an indication that climate change might already affect this part of the world.

Building on prognoses from the IPCC and the Danish Meteorological Institute the expectation is that climate change in Denmark will lead to a warmer and wetter climate and more frequent extreme weather events (IPCC 2014, Olesen et al. 2014). The prognoses are that there will be more rain in winter and summers will have longer periods of drought combined with heavy downpours. Storms may also become more severe and potentially more damaging. This, together with the
expected rise in sea level, leads to the prediction that Denmark will experience more frequent, larger and more damaging floods in the future, caused by storm surges or cloudbursts (Olesen et al. 2012). In a Danish context, climate change adaptation is therefore primarily connected to flood protection or to reducing the damage floods or storms can cause (Lolland Municipality 2012, Naturstyrelsen 2012, The City of Copenhagen 2011). Flood protection is therefore the main focus of this study in relation to how private homes in Denmark can be adapted to climate change.

Before presenting the research questions that have led this research project, I will shortly describe the background for my project and some of the main thoughts and concerns that have been central to the final framing of the study.

The process of defining the research questions

This PhD project is a part of the Nordic Centre of Excellence NORD-STAR, which is a collaboration among seven universities and a number of other research organisations and non-academic stakeholders from all five Nordic countries. NORD-STAR defines its aim as:

We aspire to a Nordic region that can adapt sustainably to the inevitable impacts of climate change and the unintended consequences of climate policy. Pursuing innovative science, sound economic analysis and effective communication, our goal is to enable Nordic stakeholders to design and implement successful adaptation policy and practice. (NORD-STAR 2015)

This study contributes to this aim by zooming in on the perceptions and actions of private homeowners through qualitative case studies.

In the initial phase of this PhD project, the working title provided by NORD-STAR was “Responses of individuals and households to climate change and climate change policies”. Responses here were meant as including both mitigation as well as adaptation responses. Underlying this was the aim of NORD-STAR to challenge the separation of mitigation and adaptation issues that is dominant both within research and politics. The approach adopted by NORD-STAR, on the other hand, was also to study the synergies and conflicts there are or could be between mitigation and adaptation work in the Nordic countries. By using the word ‘responses’ the various NORD-STAR projects would therefore be open to climate change being able to effect a response directly through weather events but also through the myriad of new climate policies being implemented to mitigate climate change,
as well as through an overall growing awareness about the need to save energy. However, in the first phase of my data collection it became clear that for the homeowners studied mitigation and adaptation were very separate issues, and no concrete synergy or conflict existed between them. Mitigation issues, for instance, such as saving energy, were mentioned in completely different terms than the issue of securing the home against a future with more extreme weather. Of course, homeowners do sometimes have to prioritise how they use their money on different home improvements they would like to carry out, but no special connection was found here between energy renovation and flood protection. Therefore, in the initial phase of my work I found myself struggling to incorporate both mitigation and adaptation. The problem I faced in seeking to study both issues was that my focus, both in the interview stage and later in the writing process, would have become very broad at the expense of detail. I therefore decided mainly to focus on adaptation, as this choice allowed me to support the aim of the overall NORD-STAR project best. However, a further motivation was that several studies already existed on the mitigation action of homeowners but no qualitative studies had been made in a Nordic context examining the adaptation of private households in relation to climate change. I therefore felt that I could contribute with new knowledge in this area. This said, as the decision grew out of my empirical findings, mitigation issues were still in play in the first part of my data collection. Therefore, despite my main focus becoming adaptation, I saw no reason not to use the findings of interest obtained in relation to mitigation. In my second article, where I discuss decision making related to more general refurbishment in private homes, I therefore use a mitigation case as an illustration, reflecting my tortuous research process. In the final chapter of this first part of this thesis, presenting the project, I argue how in the end this winding road came to contribute to a coherent conclusion of how homeowners can and do respond to climate change.

A central part of NORD-STAR is to make research relevant for policymakers and in this sense policy analysis is a central aspect of the overall aim of the centre and therefore also included in this PhD project. However, the interest of this study is to explore in detail the perceptions and actions of homeowners and not to make a broader policy analysis related to homeowners. The project takes instead an analytical look at policy as one among many elements that has potential to influence homeowners’ adaptation actions. My goal has been to make my research relevant for policymakers by giving insight into how policy interacts with a number of other factors in the everyday lives of homeowners. I put forward a number of explanations for how and why policies have, or sometimes do not have, the effect that the policymakers intended. I have not analysed any policy in particular,
but instead hope to contribute to a deeper knowledge of what shapes and can shape adaptation actions of homeowners.

On the background of the different concerns involved and decisions taken in the initial stages of my PhD projects, I developed the following three research questions:

1: How do homeowners perceive their own lives, their households and their local area in relation to the effects of climate change?

2: What makes homeowners adapt their private homes to climate change?

3: Do climate change and climate change policies affect the transitions that are taking place in private homes?

**Two cases studies and three articles**

On the background of my decision about focusing on flood risk in relation to climate change adaptation of private homes, I chose to study two cases where flood issues were a central concern. The cases I selected were a number of single-family homes on Lolland and a housing cooperative in Copenhagen. Both Lolland and Copenhagen have experienced some kind of extreme weather event during the last few years and are also designated to be especially vulnerable in relation to future climate change. I therefore expected that homeowners in these areas would have a greater interest in climate change adaptation than homeowners in many other places in Denmark. I explain my selection of case studies in further detail below in the methodological chapter.

I have presented the findings from the two case studies in three articles. The first article, “Climate change or variable weather: rethinking Danish homeowners’ perceptions of floods and climate” has been written in cooperation with my supervisor Lars Kjerulf Petersen. This article builds on the Lolland case study and focuses on how local landscapes, weather and different water management technologies, such as pumps and dikes, shape how homeowners perceive their own risk related to climate change and how this influences what kind of adaptation actions they find meaningful. The second article, “The practice of dwelling and the nature of decision making: A practice theoretical approach to maintenance, refurbishment and reparation of private homes in the context of climate change”, I have written together with Håkon Fyhn from NTNU, Trondheim. Here we combine my case studies with one of his in an analysis of what drives reparation, maintenance and refurbishment in private homes. We argue that it is possible to identify a rather stable ‘practice of dwelling’. On
In this background we discuss the efficiency of most present climate change policies aimed at private homeowners, and argue for the potential in changing focus from solely decisions relating to large refurbishment projects, to including the full practice of keeping a house in repair. The final article, “Understanding Controversies in Urban Climate Change Adaptation: A case study of the role of homeowners in the process of climate change adaptation in Copenhagen” is again written together with Lars Kjerulf Petersen. This article builds on the Copenhagen case study and, by focusing on the technology of local rainwater handling, the article aims to explain the controversies that exist surrounding urban climate change adaptation and the role of homeowners in adaptation planning and work. All three papers are submitted for publication in international, peer-reviewed journals. The first is published, while the others are currently in review.

**Reading guide**

I start this first part of the thesis by providing an introduction to the field of research relating to climate adaptation of private homes in the northern part of the world. In the following chapter, I will explore in detail the three theoretical approaches used in this study: (1) the dwelling perspective, as understood by the anthropologist Tim Ingold; (2) practice theory, represented here by Elisabeth Shove; and finally (3) actor-network theory (ANT), as established by Bruno Latour and further developed in the theory of urban assemblages. I discuss the strengths and weaknesses of the three theories in relation to the focus of this study and finish by relating them to the three research questions. In the methodological chapter to follow, I describe and argue for my methodological choices and present the two case studies in more detail. The results from the study fall into two main categories, which I present in the findings chapter. The first relates to how climate change is perceived by the homeowners and how these perceptions are connected to their actions. The second relates to how we on a more general level can understand the actions of homeowners when they repair, maintain or refurbish their homes. In the concluding chapter I again return to the research questions to argue how this study has contributed with new insight into the field of adaptation of private homes and given perspectives for further research.
Introduction to the field of research

In this first chapter I give an introduction to the field of research related to climate change adaptation of private homes in northern countries. Just a few years ago research on climate change adaptation was mainly seen as something relevant in relation to southern parts of the world, where droughts and extreme heat were expected to be a growing problem. Especially in the Nordic countries, climate change was considered a non-issue. However, in the last few years more research has been published focusing on the implantation of and controversies surrounding climate adaptation, also in the Nordic countries. Still, most of the studies look at adaptation planning on a municipal or national level (see e.g. (Eriksen et al. 2009, Lisø et al. 2003, Næss et al. 2005, Porthin et al. 2013, Cashmore and Wejs 2014, Nilsson et al. 2012)). As the majority of adaptation projects aim to involve, or at least protect, private homes, I find that this is an area of climate adaptation research that could deserve more attention, despite that a number of studies do exist related to climate change adaptation of private homes in the northern part of the world. I will in this chapter give an introduction to the most central of these studies, and argue how the present thesis contributes to the knowledge already existing in the field.

Several research areas relate to the field of adapting private homes to climate change and I, here, present the most relevant of these and relate them to one other. First, I provide an overview of existing studies and perceptions of climate change and what influences concern about the effects of climate change in the northern context. Thereafter, I present studies of the connection between flood experience and flood protection measures. I then move on to studies that not only look at external factors influencing the concern of homeowners, such as extreme weather events, but also include the importance of different social and psychological factors. In the last part of this chapter I present two studies that argue that risk perceptions and adaptation actions vary in different social contexts, and that to understand why, we have to go into detail concerning the relationships between humans and their material surroundings. These two studies have provided central inspiration for the theoretical and methodological approach of the present research project. Finally, I argue how also a number of practice theoretical studies about energy renovation have influenced my analytical work.
**Concern about the effects of climate change**

Even though the majority of people in the northern part of Europe now have some form of knowledge about climate change and believe a relationship to exist between human behaviour and the changing climate, climate change is still a very distant problem for most, especially in relation to their own everyday lives. Their knowledge about climate change is limited and they feel uncertain about both the effects of climate change and how they themselves can respond to what most of them see as an issue of concern (Lorenzoni et al. 2007, Norgaard 2011, Næss and Solli 2013, Brace and Geoghegan 2011, Hinchliffe 1997). Furthermore, other studies show that the majority of people in northern Europe do not expect climate change to have any direct influence on them or affect their local area in their lifetime (Hinchliffe 1996, Hulme et al. 2009, Petersen et al. 2009).

Phil Macnaghten (2003) argues that a main reason for the lack of interest and concern about climate change is that climate change is most often framed as a global problem. In the media and policies, climate change is mainly presented as something affecting ‘global nature’, and not many examples are provided of how it might come to affect ‘local nature’ and thereby everyday people’s everyday lives, he argues. Macnaughten continues by arguing that concern and awareness about climate change can be raised if people obtain insight into local consequences. Macnaghten’s research is mostly concerned with how mitigation action is motivated, but his findings also point to similar problems in relation to raising concern about the need for climate adaptation. If adaptation is framed as more a global than a local issue, local adaptation actions can be seen as less important. The following study by Lorraine Whitmarsh look precisely at how climate change is seen as a global problem unconnected to local weather events. In the majority of northern countries climate change is connected to an increased risk in flooding; floods therefore present one way in which the local effects of climate change could be felt or illustrated.

Whitmarsh (2008) has explored whether people living in the south of England who have experienced floods are more concerned about climate change than other people. She concludes that they are not more concerned to any significant extent because they do not associate their flood experiences with climate change:

> Experience of flooding does not ‘prove’ human-induced climate change is real or threatening in the way that it proves the risk from flooding is real. Flood victims rely principally on second-hand information about climate change and the reasons for
changing weather patterns just as the rest of the non-expert public do (Whitmarsh 2008:368).

Therefore, this kind of experience with extreme weather does not make climate change more visible. Instead:

Flood victims tended to identify a number of local observable causes for flooding, such as road widening and resurfacing, lack of maintenance of watercourses, removal of hedges, local development, pumping station repairs, and so on (Whitmarsh 2008: 368).

Whitmarsh therefore concludes that experiencing a flood does not necessarily make people more interested in mitigating climate change.

In another study, this time from Norway, Kari Marie Norgaard (2011) carried out fieldwork in a small village during an unusually warm winter, 2000-2001. She was surprised by the lack of any connection between the global climate change that the residents are clearly aware exists and this local weather event. She explored why this warm winter, that would have a large negative effect on the local community’s economy due to its dependency on winter sports, did not raise concern and action on the basis of climate change. Her conclusion is one of firm denial among the residents, mainly because the problem of climate change is considered to be unmanageable and impossible to respond to.

In this way, Whitmarsh and Norgaard conclude that people in this northern part of the world do not connect local extreme weather events to climate change, and extreme weather events therefore do not contribute to raising awareness of climate change or knowledge about possible local effects. Macnaghten, Whitmarsh and Norgaard all put forward explanations for this; however, I have found this to be a topic that warrants exploration in more detail. One relevant question is how a social consensus arises around local explanations for extreme weather events rather than these events being seen in the light of climate change.

Connections between flood experiences and flood protection measures

Despite that Whitmarsh (2008) argues that experiences with extreme weather do not seem to be related to concern about climate change in general, several other studies show that there is a connection between experiences with extreme weather and homeowners’ understandings of the
extent to which they are at risk and the ensuing action they take to adapt to this situation (Kreibich et al. 2010, Thieken et al. 2007, Wind et al. 1999, Smith 1981). The following studies focus on experience with flood risk.

Kreibich et al. (2010, 2005) studied private households’ and businesses’ preparedness in connection with the 2002 and 2006 flood events on the Elbe River in Germany. They conclude that before the flood on the Elbe River in Germany in 2002, 59 % of households affected by the flood did not know that they were living in a flood-prone area (Kreibich et al. 2005). In 2006, most of the households knew that they were located in a flood-prone area, including those who had not been affected by the 2002 flood, and this knowledge made them take adaptive measures (Kreibich et al. 2010). Kreibich et al. (2010) therefore conclude that flood experience in their local areas was the main factor influencing homeowners in taking precautionary measures to avoid flood damage. Also H. G. Wind et al. (1999) show in their study of flood damage from the 1993 and 1995 Meuse floods in Belgium and the Netherlands that impact for private households was lessened in 1995, partly as a result of the experiences gained from the flood in 1993 and as preventive measures had consequently been adopted. Finally, a qualitative study of coastal dwellers in Germany and Denmark also supports these findings (Koerth et al. 2013). However, this study finds that personal experience of floods can be connected to measures requiring small investments but not to large investments. To understand how homeowners can be motivated to more extensive adaptation projects, they argue that further research is required.

The above studies are all quantitative. They looked at the flood damage in economic terms, and how this damage is reduced as an effect of past flood experience. However, other studies reveal how adaptation measures might be influenced by other factors than personal experience and economic loss, and therefore cannot be fully understood by looking at flood damage in quantitative terms alone. Those other factors might help explain why personal experience with floods only leads to smaller and not larger adaptation measures being taken, as identified by Koerth et al.

**Other factors that influence when and how adaptation measures are adopted**

O’Brien et al. (2010) make an argument for including what they call the subjective dimension of climate change when trying to understand what drives adaptation actions. With this, they mean that we need not only look at potential loss in economic terms. Instead, they argue for inclusion of
values and worldviews as explanatory factors, to understand when and why different people find adaptation measures relevant. A main point for them is that different things are at stake for different individuals and different social groups. Also Adger et al. challenge that explanations for when and how adaptation measures are made can always be found in economic capacity and technical options. They write, “societal adaptation is not necessarily limited by exogenous forces outside its control. More often, adaptation to climate change is limited by the values, perceptions, processes and power structures within society” (Adger et al. 2009:349). The following studies attempt to broaden the type of explanation given for when and how people take adaptation measures, by also including psychological and social factors.

Grothmann and Reusswig (2006) argue that there is not always a direct connection between knowing that one lives in a flood risk area and taking measures to adapt to the risk. They argue that factors such as the experience of one’s own capacity to make a difference, denial and fatalism also influence the willingness and capacity to translate knowledge about risk into action. They argue that it is important for people to feel that they are able to make a difference with their actions (Grothmann and Reusswig 2006:118). If people experience that the power of nature is too strong for them to influence, it may be a reason to do nothing and just hope for the best. Also in another study by Grothmann together with Anthony Patt (2005) the authors argue that perceptions of one’s own adaptive capacity, together with perceptions of one’s own risk, have a higher explanatory power for when adaptation measures take place than socioeconomic factors such as home ownership and household income. This perspective is partly supported by another study by Thieken et al. (2007)\(^1\). Here they argue that especially more information about possible protective measures and their efficiency would motivate people to take action, as this would give them knowledge about concrete ways in which to respond that would make a difference. All of these studies are based on qualitative data. Below, I refer to a small number of other qualitative studies exploring what can influence adaption action.

Williams et al. (2012, 2010) have made a study of the conditions for, and challenges of, adapting Englands’s suburbs to climate change. The data for homeowners is built on workshops with practitioners and policymakers involved in adaptation work with homeowners in suburban areas. Here, it is argued that several factors influence adaptation measures taken, including the physical

\(^1\) This study is mostly written by the same researchers as Kreibich et al. (2005; 2010), and builds on the same case study involving the 2002 and 2006 flood events on the Elbe River in Germany.
characteristics of the neighbourhood, economic capacity of the homeowners and local government and the overall understanding of and attitude towards climate change. They identify a challenge in the form of a resistance towards all kind of change that often exists in suburban neighbourhoods. It is therefore positive if adaptation measures can be “incorporated into regeneration schemes, ongoing maintenance, greening initiatives and so on” (Williams et al. 2012:9). The chances of success would thereby become greater, as the measures would be seen as improvements, not as change.

Johanna Wolf et al. (2010) have examined how social networks influence experience of risk. They have looked at heat waves, but argue that the findings may be relevant for other types of extreme weather events too. On the background of interviews with 105 English people between 72 and 94 of age Wolf et al. argue that social networks are mostly seen as something making people more resilient, but they may also have the opposite effect. In social networks people can support each other and reconfirm the point of view that they are not at risk. Even though the study does not relate to flooding, I find its conclusions interesting, as it identifies that together members of social groups can create a risk perception that goes against the prevailing scientifically founded understanding. This study is the one that most clearly argues that risk perceptions can be seen as socially shaped and upheld, and can help to understand why adaptation measures are not taken.

These studies all show how different social and psychological factors are at play in relation to when and how adaptation measures are taken. The last study in particular is relevant, as it argues how both risk perceptions, and thereby the reasons for adaptive measures being taken, have to be understood as a part of a social context. As has much other climate change research, adaptation studies to date have been dominated by a natural science approach, where the aim has been to perform risk assessments by means of calculating and mapping specific risk areas. This, in turn, has then been used to argue where and how adaptation measures should be applied. Wolf et al. indicate the need not only to look at risk perceptions and adaptation actions as the result of scientific models and risk mapping, but instead to explore how different risk perceptions are created socially and how other factors than economic or technical limits can prevent adaptation measures being taken. This is a complex research issue that I find warrants more detailed exploration. The studies described above identify again denial, as well as fatalism, perceptions of one’s own adaptive capacity and a general resistance to change as reasons for the lack of adaptation action. I found it relevant to go behind these factors, and try not only to conclude that they have an influence but to look at how
they come to exist through the way homeowners give meaning to climate change and their everyday lives as inhabitants in a specific landscape. A number of studies have followed this line of thought and thereby have provided inspiration for the way in which I have approached the issue in this PhD project.

**Including connections with local landscapes, everyday life and non-human actors**

Catherine Leyshon (née Brace) and Hilary Geoghegan (2011:295) make an argument for including the “embodied, practised and lived – landscapes of everyday life” in research about people’s understandings of climate change. They build this especially on a case study of climate adaptation on the Lizard Peninsula in England (Geoghegan and Leyson 2012). Their main argument is that people’s personal experience with their local landscapes shapes how they understand climate change, and thereby how they understand the meaning of different adaptation measures. Furthermore, they argue that as the detailed and concrete effects of climate change remain uncertain, conflicts and debate can arise surrounding how and when to adapt to this unknown future (Leyshon and Geoghegan 2012). To understand how people respond to and perceive climate change in different ways, they see that we therefore need to include lived experiences with local landscape. I am inspired by this perspective in my approach to understanding the responses of homeowners to climate change.

I found another central inspiration in Andrew Karvonen’s (2011) study about urban runoff in two large North American cities; Austen and Seattle. He argues that if we seek to understand the dilemmas and discussions involved in handling rainwater in urban areas, we have to include the non-human actors, not as background factors but on an equal level as the human actors. We have to explore how humans and non-human actors are associated and how these associations are a part of and shape the urban runoff issue. Concretely, he argues for including non-humans in the democratic decision process of defining urban development. In this way it is possible to move towards solutions that not only take social, but also natural, considerations into account, and thereby create solutions that are more sustainable and effective in relation to climate change.

On the basis of these two studies, I found it relevant in looking at responses to climate change to apply a special focus to experiences with local landscapes and connections between humans and
non-human actors. Climate change, floods, rain and the sea are of course central non-human actors in my study, but as I look at homeowners, another central actor is the property itself. I do not attempt only to understand how homeowners perceive climate change, but also how their homes can be transformed in response to the effects of climate change. Several of the studies mentioned above look at what drives adaptation action by homeowners, but the action is always studied in isolation from the remainder of the homeowners’ life in and around the home. The study of Williams et al. (2012) advocates introducing adaptation through the regular home maintenance and improvement activities of properties and neighbourhoods, but they do not go into detail with this argument. Similarly, I have not been able to find other studies exploring in detail how adaptation measures are or can be looked at in relation to the everyday lives of homeowners and the regular work they perform to keep their properties in repair. However, a number of studies have explored this in relation to mitigation. I have therefore further found inspiration in these.

As a part of a study by Bartiaux et al. of energy renovation in four European countries, energy renovation of Danish homes has been examined. A practice theoretical approach is used to explore what drives homeowners to undertake energy renovation. In the study they find that saving energy is most often not the main grounds for renovating homes, but is often seen as an additional bonus when renovating for other reasons (Bartiaux et al. 2011). The same researchers behind this article contributed in the summer of 2014 to a special issue of “Building Research and Information” in which they explore the practice theoretical approach to energy renovation further. In the editorial, Kirsten Gram-Hanssen highlights a central finding on the background of the articles. She argues, “The reality is that retrofitting is a continuous process, which is negotiated against and in relation to different everyday practices and economic and technical possibilities”(Gram-Hanssen 2014:397). In this ongoing process, energy renovation is just one possible action out of many and it therefore cannot be looked at in isolation but must be seen in relation to homeowners’ continual process of everyday living (Judson and Maller 2014, Vlasova and Gram-Hanssen 2014). I found this perspective on energy renovation interesting in understanding what drives reparation, maintenance and refurbishment of private homes in general. However, I also argue that it is relevant for a better understanding of homeowners’ adaptation actions. What I draw especially from these different energy renovation studies is that also adaptation measures should be seen as a part of the ongoing refurbishment of a home, not as isolated actions.
As the body of research on adaptation of private homes in the northern part of the world is not extensive, this research project is able to contribute to the field of adaptation research by its focus on homeowners, instead of public planners or policymakers. Its explorative and qualitative case study approach is able to expand the knowledge about the complexity that surrounds adaptation of private homes. By building on the last-mentioned studies, this thesis contributes with insight into how experience with local landscapes is able to influence both perceptions and actions of homeowners, but also how experiences with extreme weather and landscapes have to be seen in connection with the role of non-human actors, such as various stormwater and storm surge management technologies. Finally, a central finding of the present study is that adaption action is not something that can be analysed independently, but rather has to be seen in relation to the general everyday lives of homeowners. In this way, this study adds to the knowledge of what underlies the responses of homeowners to climate change, and thereby how these responses might be politically influenced.
Theory

Towards the end of the 1970s a number of American sociologists, spearheaded by William R. Catton, Jr. and Riley E. Dunlap (1978) and Frederick H. Buttel (1978), began to criticize earlier sociologists for their anthropocentrism. Their argument was that emergent environmental problems such as pollution or resource shortages showed that it was no longer possible to study societies as detached from materiality. They therefore put forward what they termed ‘environmental sociology’ as an alternative field of study. The main focus of this new environmental sociology was to give materiality and the environment a much more central role in sociological research. Today the term ‘environmental sociology’ covers a large range of theories with radically different interests as well as ontological and epistemological understandings, but common to all of these is an interest in the relationship between the social and the material (Bell 2009). As the present research project spans both what are normally understood as social as well as material factors, my theoretical starting point is three theories, each of which connected to environmental sociology: (1) the dwelling perspective as understood by the anthropologist Tim Ingold; (2) practice theory, here represented by Elizabeth Shove; and finally (3) actor-network theory (ANT), as established by Bruno Latour and further developed in the theory of urban assemblages.

These three rather different theories have contributed with important additional insight into the issue of responses to climate change by private homeowners. By working with three different theoretical perspectives, it has been possible to examine my empirical data from various angles. The theory of Ingold has provided a phenomenological perspective focused on perceptions and experiences of homeowners. Shove’s theory has provided a practice theoretical perspective interested in how practices are created and transformed, and ANT together with assemblages theory has offered a special sensibility towards the connection between human and non-human actors, such as things, technology and the weather.

After presenting the three theoretical perspectives individually, their similarities and differences are discussed in relation to three key concepts; materiality, imagination of the future, and stability and change. The chapter ends by arguing how the theories supplement each other in framing and in answering my research questions.
**Perceiving and experiencing local landscapes**

Tim Ingold offers a very useful understanding of how humans relate to and perceive the environment they live in. Therefore his theoretical perspective has often been used in projects within the field of environmental sociology (Leyshon and Geoghegan 2012). I am here referring to Ingold’s perspective as ‘the theory of dwelling’, even though he himself does not see his writing as a theory but as a reflection of other theories and his own empirical work. However, for the purposes here, I am treating Ingold’s work on a par with ANT and practice theory, i.e. as a third theoretical approach.

Ingold (2000) writes how he developed his perspective in response to his frustration over the existing water-tight shutters between fields such as sociology, psychology and biology. He was especially interested in bringing social science and natural science closer to each other. He aimed to find an approach that did not look at the mind, body and environment as separate entities. He was particularly interested in overcoming the understanding of the mind as akin to a data-handling computer inside the head, taking in sense impressions from its surrounding and processing them with different outputs as response. Further, he wanted to challenge that everything is either socially constructed or purely a result of genetic constructions. In reaching this aim, James Gibson’s affordance theory became a central inspiration. Gibson argues that we perceive through engaging with things in our environment. Things give meaning through the way we use them and engage with them, and in this way it is not possible to separate perceptions, actions and material surroundings. Therefore, the mind cannot be seen as something “inside the head” waiting for input, but instead as something that is “out there” continually interacting with the world (Ingold 2000:3). Ingold’s second major source of inspiration was found in Martin Heidegger’s theory of ‘dwelling’. Heidegger criticises the separation we in the modern world have created between building and dwelling, as the world and our societies as readymade, or something we finish building and subsequently live or dwell in. Instead, he argues that it is through dwelling that humans continually transform and create their environment. Ingold applies this quote from Heidegger; ‘We do not dwell because we have built, but we build and have built because we dwell, that is because we are dwellers . . . To build is in itself already to dwell . . . Only if we are capable of dwelling, only then can we build’ (Heidegger 1971: 148, 146, 160, in Ingold 2000:186). In this way, Heidegger, just as Gibson, argues for removing the separation between humans and their environment, between social and material factors. When humans act in the world, they at the same time continually create both
themselves and the material world in which they live. Building on those theoretical inspirations, Ingold perceives humans as “being in the world”, meaning a part of the world in which they live, not self-contained individuals confronting a world that is “out there” (Ingold 2000:173). To explain Ingold’s perspective in more detail, a description of his definition of the concept ‘landscape’ is now presented, as this definition includes his most important arguments and, moreover, is a concept that has been central to the analysis in this study.

To dwell in a landscape

Ingold defines ‘landscape’ by saying what it is not. It is not ‘land’, it is not ‘nature’ and it is not ‘space’. Let’s look at those arguments in turn. Firstly he argues that landscape is not something which can be measured, as can be done with ‘land’. He writes, “you can ask of land, as of weight, how much there is, but not what it is like. But where land is thus quantitative and homogeneous, the landscape is qualitative and heterogeneous” (Ingold 1993:153). In this way, landscape is something that is experienced and understood through the senses. Feelings, memories and experiences can be connected to a landscape and thereby a landscape will not be the same for everybody. Different people will have different experiences from their interaction with a landscape. Some may experience landscapes through hunting for food, others through hiking for pleasure. This will result in different explanations of what it is like.

Secondly, Ingold argues how ‘nature’ is often understood as something “out there”; as something ontologically separated from us as human beings (Ingold 1993:154). However, in his landscape concept he does not make this separation between us and our environment. Building on his understanding of humans as “being in the world”, he does not see landscape as disconnected from the people dwelling in it, but rather a part of the ongoing flow of transformation taking place in a landscape. He writes, “through living in it, the landscape becomes a part of us, just as we are a part of it” (Ingold 1993:154).

Finally, Ingold compares ‘landscape’ and ‘space’. He writes how in a landscape a distance between two points is understood as the journey made between these, a bodily experience of moving and feeling the landscape change around you. In comparison space is understood as the way we understand maps. Maps are produced by taking a number of measurements and creating one single picture. Here a journey can be seen as a line on the map, which can be surveyed in a single glance.
This is not possible with a landscape, as it changes along with the position of the observer. Here Ingold therefore again underlines landscape as multiple, as it is something we engage with through our senses and understand based on our individual and collective experiences.

The definition of ‘landscape’ highlights two of Ingold’s most central arguments. The first is that he sees the world as always temporal and in constant transformation. Landscape and societies are not something we can keep still and look at as stable factors; they change, and we as humans are embedded in this change. It is, however, possible to question this understanding. Is everything indeed in a state of continual transformation, or can we find examples of stability over longer periods of time? Especially in connection with environmental sociology, stability is often find to exist, and is often as relevant to explain as transformation. An environmental aim is often to create change where stability exists; e.g. change in energy consumption patterns or building traditions. Ingold argues that some changes take place very slowly, so slowly in some cases as to appear to be at a standstill, such as the topography of a landscape; the majority of hills and valleys remain more or less unchanged over the course of a lifetime, but still, if we look over several geological periods, significant changes do occur (Ingold 1993). In this way, Ingold holds on to his perceptions of transformation as an overriding condition for all things. Despite seeing some kind of stability in nature, at least over shorter time periods, when looking at dwellings or societies Ingold’s argument is that they transform continuously and at a much higher speed. This makes his theory difficult to apply when trying to explain stability, also in particular in human dwelling. Furthermore, it is relevant to question whether we as human beings would be able to navigate in the world, if it, to the extent that Ingold argues, is in a continuous state of flux? Ingold argues that transformation is part of dwelling in the world, and to him, such a question would therefore be irrelevant. However, other theories, including practice theory, argue how precisely stability is something we need and aim for, as this condition enables us to act in our everyday life without having to reflect upon every single action. Discussions of transformation and stability are dealt with in more depth later on in this chapter. For now I simply note that the aspect of Ingold’s theory described here in relation to transformation in relation to dwelling is one in which I find limitation.

Ingold’s second main point illustrated by his understanding of landscape is rooted firmly in Gibson’s theory and the argument that human experiences and perceptions are connected to materiality. Ingold argues for “privileging the understandings that people derive from their lived, everyday involvement in the world” (Ingold 2000:152). As humans are seen as being part of the
transforming world, it also on this background that we understand ourselves and our surroundings. We do not look at our life and society from above, we understand them on the basis of our everyday experience of being in the world. In this way Ingold is privileging hands-on understandings over abstract knowledge such as that obtained from maps or measurements. According to Ingold, humans understand the world by physically interacting with it. Again here, I see a limitation in Ingold’s theory. For are there not parts of our way of understanding the world, and our local landscapes, that come from other sources than hands-on experiences? In my first article with the Lolland case study, it is argued that the homeowners’ personal experiences do not stand alone in influencing their perceptions of risk in relation to climate change. Some overall social beliefs, or what can be called discourse, about their ability to control nature also influence their perceptions of risk. Here, once again practice theory, and especially ANT, is able to address shortcomings identified in Ingold’s theory in this regard.

Despite the limitations found in Ingold’s theory, his dwelling perspective is still useful in relation to understanding human interactions with their environment. Especially three aspects of his work have been found relevant in this study; the concept ‘weather-world’, the dwelling perspective specifically connected to private homes, and the role of imagination. I will now discuss these three in turn in more detail in the sections to follow.

**Living in a weather-world**

Ingold has a special focus on how the weather is a central part of our “being in the world”. He argues that to live in the world is not to be “stranded on the outer surface of the earth but to be caught up in the transformations of the weather-world” (Ingold 2007:S19). The weather in this way is something we meet through our senses. We feel the wind, hear the rain, smell the grass, taste the salt in the air and see the waves rising on the sea. He writes:

> To feel the wind is not to make external, tactile contact with our surroundings but to mingle with them. In this mingling, as we live and breathe, the wind, light, and moisture of the sky bind with the substances of the earth in the continual forging of a way through the tangle of life-lines that comprise the land” (Ingold 2007:S19).

The weather, as we experience it through our senses, shapes how we perceive our local landscapes and thereby the world.
Ingold brings this perspective into understandings of lay people’s perceptions of climate change. In an article building on a case study of Sami People written together with Terhi Kurttila (2000:187), the two authors argue that “whereas scientists were out to detect changes in climate, what mattered to local people were the changes in the weather”. Again here, their argument builds on the difference between seeing the world through measurement and experiencing the world as a part of everyday life. Ingold and Kurttila argue that scientists see climate change through their measurements, which have been recorded over a long period of time. Scientists talk about means and variations, and see change in terms of numbers. Lay people, on the other hand, understand climate change through their everyday experiences with their local landscape. In reality, scientists and local people are often talking about two different things when referring to climate change; scientists talk about climate as an abstract category, local people talk about the weather as they experience it through their senses (Ingold and Kurttila 2000). I clearly see some truth in this analysis in the Lolland case study. Here, several of the homeowners I interviewed refer to personal experiences with the local weather, both when they argue that climate change is already taking place or that it is not taking place. At the same time, however, all the homeowners also talked about climate change in terms of numbers, and referred to climate models and melting ice at the North Pole. In this way, they referred to what Ingold and Kurtilla call scientific arguments, not only personal experiences. I will argue that most people in the western societies obtain a large part of their information from media and broader social discourses. Saying that lay people mainly understand climate change and their own risk on the background of personal experience may therefore be a simplification. Ingold favours ‘hands-on-experience’. However, in light of the shortcomings of this approach alone, I find it important to supplement Ingold’s theory about perceptions of climate change with other theoretical perspectives. In the case of Lolland I use ANT to argue how the homeowners’ understanding of climate change is not only influenced by personal experiences, but also a shared belief in scientific progress, building on insights that reach much further than their own hands-on experience.

Dwelling has to be continually performed

Ingold’s dwelling perspective is defining for his theory as a whole and, as such, the concept of dwelling is used in a large number of contexts in his body of work. However, I found the concept of dwelling most useful in connection to private homes. Ingold argues that the perspective dominating
among architects, engineers and other professionals involved in managing and building private housing is that a house is something that is first built, whereupon people move in and live in the finished product. Ingold calls this “the building perspective” (Ingold 2013b). As an alternative, he proposed his own “dwelling perspective”. Here he argues that houses too are in constant transformation. A house changes when the people living in it are “keeping it under repair, decorating it, or making structural alterations in response to their changing domestic circumstances” (Ingold 2000:187). In this sense, a house is never finished. I use this part of Ingold’s theory in the second article to argue how the dwelling perspective creates ongoing potential for improving the energy efficiency and resilience of private homes. As houses are in constant transformation, every change presents an opportunity to think in terms of climate; it is not only possible to do so at the time when a house is built or when major refurbishments are undertaken.

Adapting to an imagined future

The last part of Ingold’s theory I will highlight here is his inclusion of imagination as an important factor in understanding people’s actions and understandings. Ingold argues how we should not separate imagination from perception. As “[p]erceptions are imaginative, then, in so far as it is generative of a world that is continually coming into being with and around the perceiver, in and through his or her own practices of movement, gesture and inscription”(Ingold 2012:7). By this, he means that our perceptions of the world shape how we can and do imagine the future, but also that imagination shapes how we perceive the world. In this way Ingold argues that imagination and perception are two sides of same coin. Connecting this back to landscapes he writes, “An imagined landscape, then, is a landscape not of being, but of becoming: a composition not of objects and surfaces but of movements and stillness, not there to be surveyed but cast in the current of time” (Ingold 2012:10). Our way of imagining the future grows out of our past and present experiences with a landscape in continual transformation, and just as importantly, our imaginations of the future in turn influence our actions in the present. In this way it is crucial to include imaginations, stories, myths and dreams when attempting to understand how people perceive and act in the world (Ingold 2013a). I use this way of understanding imagination also for the Lolland case study in the first article to argue how the homeowners’ imagination of future climate change stems from their past and present experiences with their landscape. This again directly influences what kind of adaptation actions they find meaningful. However, I also find it necessary here to supplement Ingold’s theory
with other theories. Urban assemblage theory argues that the way we are able to imagine the future is closely connected to the existing assemblages of both human as well as non-human actors. These assemblages include not only local landscapes but also global factors, discourses, politics, technologies and much more. Urban assemblage theory is therefore able to supplement Ingold’s understanding of the role of imagination. I will discuss this in more detail further on in the chapter.

Above, I have presented some of the central aspects of Ingold’s dwelling perspective. I continue by moving on from experience and perception to collective practices.

**Actions as being embedded in practice**

In a practice theoretical approach the individual becomes less interesting in itself and instead is mainly included in analysis in its role of being the carrier of practices. Practice theory is the collective name for a number of theories that understand human behaviour by looking at how our daily life is built up around many different practices. Among others, Pierre Bourdieu (2005), Bruno Latour (2005), Anthony Giddens (1985) and Theodore Schatzki (2001) are seen as some of the first theorists to work with this perspective and to have delivered the basis upon which newer practice theory builds. Andreas Reckwitz has sought to make a synthesis of these different first theoretical understandings of practice, and offers the following definition:

A ‘practice’ (Praktik) is a routinised type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge (Reckwitz 2002b:249).

What is often seen as most central in this definition is the word ‘routine’ (Halkier et al. 2011, Shove et al. 2012). A ‘practice’ is a more or less routinised type of behaviour. It is an action people have performed so many times before or are so familiar with that they do not stop up and reflect upon it every time they do it, they just do what they always do in this or that situation (Petersen 2011). Routines are a central part of the definition of practice, but also the aspect that has been discussed the most in relation to what can be defined as a practice. In the second article, I explore this debate by extending the practice concept further than to very embodied and routinised practices, such as showering, cooking or driving a car. I argue that it is possible to talk about a ‘practice of dwelling’ meaning the practice of taking care of a house and keeping it in good repair. I build this concept on
Ingold’s understanding of dwelling as precisely an ongoing practice. Several practice theorists, on the other hand, would argue that this does not constitute a practice, as changing windows, repairing a leaking tap or installing solar panels are not acts you perform every day. These actions are not routinised to an extent where you do them without thinking, they would argue. However, I still see some important aspect of practice in these kinds of actions. They are not performed every single day, but they still build on embodied knowledge, understandings and knowhow about how things are normally done and what to do in different situations. They also, as do other practices, build on socially shared conventions about convenience and comfort (Shove 2003a). I will therefore argue that even though routinisation is central in Reckwitz’s definition of practices, practice theory can also contribute with interesting understandings in situations where routines do not play that strong a role.

Another aspect of Reckwitz’s definition important to point out is the way he places “things and their use” on a par with knowledge, understandings and emotions. This perspective on materiality is not something all the above-mentioned early practice theorists agree upon. Both Bourdieu and Schatzki place things and technology as backgrounds for actions, not on the same level as human thought and action. In Reckwitz’s definition, the perspective on materiality is therefore taken more from the line of thoughts of Latour (Reckwitz 2002a), in the sense that the border between the material elements and social elements is removed, and instead materiality is seen as just one among many factors that become part of a practice. Most newer work within practice theory builds to a smaller or larger extent on Reckwitz’s definition of practice (Shove 2003b, Warde 2005, Halkier et al. 2011, Gram-Hanssen 2010b). This means that materiality plays a much more central role in more recent practice theory than in earlier work such as that of Bourdieu and Schatzki. I build my understanding of practices and practice theory on the newer body of work, which means that for the purposes of this project materiality is indeed a central part of any practice and does not just constitute the background for practice.

**Changing perspective from decisions to practice**

The main argument in practice theory is that the social is located in practice, meaning that if we seek to understand social stability and transformation, we have to study the creation, stability and transformation of practices. Reckwitz (2002b:244) argues how practice theories are part of what he defines cultural theories. Cultural theories have in common that they try to explain and understand
human actions through focusing on how symbolic structures of meanings are created. This makes them different from theories that see individual purpose, interest and intentions as the factors with the greatest influence on actions, but also from theories which place the background for actions in norms and values. Both these perspectives connect actions to some kind of conscious weighing of options. In the first case, people are expected to act in ways that are the most economically feasible for them personally; in the second case social values are expected to be mirrored in peoples’ actions. In cultural theories, on the other hand, actions are explained by focusing on how symbolic structures of knowledge are created and thereby make us perceive and act in certain ways. These symbolic structures are understood as collective and therefore create shared ways of giving the world meaning (Reckwitz 2002b:246). Practice theories argue that these collective creations of meanings come into being through practices. The background knowledge that Reckwitz draws upon in his definition of practices is connected to broader social conventions about what is normal, and turned into embodied knowledge when the practice is performed by different individuals. In this way, practice theory explains actions more as a result of material conditions and social conventions than of individual decision making. Practice theory therefore gives a tool to understand why people’s actions are often difficult to change. As most actions are seen more as embodied practices than responses to decisions, they are not easy to influence, either by economic incentives or information aiming to change values through knowledge. In the second article, practice theory is therefore used to argue how it can be problematic if policymakers only look at the decision making of homeowners when they seek to make private homes more resilient towards extreme weather or encourage homeowners to reduce energy consumption. Instead, it is argued that by looking at the ‘the practice of dwelling’, new, and maybe better, options to influence the actions of the homeowners may present themselves.

**A practice theoretical approach to environmental sociology**

Practice theory has been increasing applied within environmental sociology over the last few years. Its popularity can be seen as a reaction to the focus on lifestyle and green values that has dominated earlier environmental research (Petersen 2011, Bartiaux et al. 2011). Before, there has been a tendency to expect that people who see themselves as ‘environmental friendly’ or ‘green’ consumers in reality also use less energy and display ‘greener’ consumption patterns than people less aware of environmental problems (Shove 2010). However, various studies have shown that this
is not always the case (Holden and Linnerud 2010, Gram-Hanssen 2010a). This has resulted in a need to find other explanations for the way people act in their everyday lives and here practice theory has been seen as useful. As practice theory challenges the direct connection between values and action, it is able to present other explanations for inability in people to live in a more environmentally sensitive way. The routinised and embodied aspect of practice is key here, together with the dependency on material factors. Furthermore, earlier lifestyle-oriented theories focused on the kind of consumption by which we create and communicate our identities; such as clothes, mobile phone, cars and so on. Practice theory, on the other hand, has contributed to turning attention instead to ordinary consumption aspects of everyday life. Consumption of energy, petrol, heat, food are looked at as part of everyday practices, not something connected to choices about lifestyle as an identity marker (Shove and Warde 2002, Gram-Hanssen 2010b, Holden and Linnerud 2010). This helps us to understand why a ‘green’ lifestyle might make people buy more organic food than the average consumer but still not be able to reduce energy consumption in their homes.

Finally, another important contribution that practice theory has made to environmental sociology, in general, is to not only look at the different aspects of everyday life individually, but instead focus on how the many different aspects, mentioned in Reckwitz’s definition, interact. Kirsten Gram-Hanssen writes:

> On the basis of a practice theory approach, one cannot expect simple correlations between knowledge and practice, between attitudes and practice, between economy and practice, or between technology and practice. We need to understand changes in practice as part of long-lasting and ongoing processes that incorporate all these elements, and therefore the evaluation of energy-policy initiatives requires more comprehensive evaluation methods (Gram-Hanssen 2010b:163).

Gram-Hanssen argues here that practice theory is a tool to work with all those different aspects as interrelated, and to understand how creation and change of practices have to be understood as an ongoing processes.

The stability and change of practices

Over the last ten years, Elizabeth Shove has become a central figure within environmental sociology as a result of her practice theoretical approach. Much of my practice theoretical argumentation is built on her theories. Shove was one of the first to introduce practice theory into environmental research (Shove 2003a). However, what has especially led to the wide recognition
and application of her work is her way of understanding how practices can not only be stable but also always have the potential for change (Shove et al. 2012). It is this attention to the tension between stability and change that I have found especially relevant in the context of this research project.

In Shove’s early work she was interested in understanding why it is so difficult to change many of our daily practices such as showering, cleaning or laundering (Shove 2003a). She looked at how conventions of comfort, cleanliness and convenience influenced what are seen as ‘normal’ practices, but also how these conventions are shaped by socio-technical systems. As she argues, the whole system of pipes bringing water into houses and the technological invention of, for instance, the washing machine, has not only made it easier to wash ourselves and our clothes but has also changed what we perceive as clean. From taking a bath once a week, we now shower once or twice a day. In the same way we also wash our clothes much more often than we did 50 years ago (Hand et al. 2005). In this way, technical innovations and social conventions about normality continually develop and influence each other, and one cannot be understood without consideration of the other.

On the background of this argument Shove challenges the idea that practices connected to e.g. cleaning or comfort can be changed by new information. Instead, attention has to be turned to the way in which the large socio-technical systems shape everyday life and social conventions. Following this argument, in the second article in this project it is argued that it is often more difficult to change maintenance and renovation practices than policymakers often expect, as these practices build on the materiality of the house as well as ideas about comfort and convenience developed over many years. Furthermore, some renovation activities are seen as a normal part of the practice of dwelling, such as replacing windows, while others, such as installation of photovoltaic and solar panels, are new aspects that have to be introduced into existing practice.

In the later work of Shove she has moved towards greater focus on how practices can and do transform. Together with Mika Pantzor and Matt Watson she argues in the book “The Dynamic of Social Practice: Everyday Life and how it Changes” (2012) that practice theory can more than simply explain why policies often do not succeed in changing individual behaviour. They argue how a practice theoretical approach can also be useful to understand how changes do take place and can be influenced by policymakers. Building on the definition of Reckwitz and others, Shove et al. develop a shorter explanation of practice. Here practice is defined as consisting of meanings, materials and competences. Competences are further defined as understandings and practical
ability. Meanings as “the social and symbolic significance of participation at any one moment”. Finally, the material element encompasses objects, infrastructure, tools, hardware and the body itself. Shove et al. argue that practices are formed or transformed by the making and breaking of links between these three elements. “This suggests that stability and routinization are not end points of a linear process of normalization. Rather, they should be understood as ongoing accomplishments in which similar elements are repeatedly linked together in similar ways” (Shove et al. 2012:24). The reason we have, for instance, a more or less stable clothes washing practice is that the majority of people have access to a washing machine, have learned how to use it, and have similar ideas about when clothes are clean or need to be cleaned. Every time we perform the practice of clothes washing we contribute to stabilisation of the practice, but if the washing machine breaks down or the meaning of what we see as clean is challenged there is potential for the practice to change. This means that practices have to be continually enacted to exist, but also that it is in this enactment that the potential for change is placed. Every time a practice is performed there is potential to link the elements of meaning, material and competences in slightly different ways. It is therefore possible to influence a practice by trying to influence the elements of the practice or the way in which the elements are connected.

In this way, Shove neither sees stability nor transformation as the ‘normal’ situation. Instead she argues that both stability and transformation have to be enacted. It is then an empirical question as to what in different situations makes a practice change, or keeps it from changing. Especially relevant for environmental sociology is exploring when and how unsustainable practices become stabilised, and how this stabilisation can be broken.

**Social conventions and socio-technical systems**

When Shove writes about stability and transformation of practices, routinisation for her is a central part of a practice. She is interested in the routinised everyday practices, but, as mentioned, in the second article I seek to extend the practice concept further and also include activities that are not performed on a daily basis. Shove would presumably disagree strongly with this move, but I rather find it problematic to limit the practice perspective only to highly routinised practices. Instead, I find the concept of practice to have explanatory power which reaches further than explanation of routine practices as defined by Shove. Above, I criticised Ingold for having too much focus on everyday and hands-on experiences. Practice theory, however, can supplement Ingold’s
understandings of how everyday practices of people are shaped in connection to their very local material surroundings by including the power of social conventions and socio-technical system. Social conventions about what is normal, combined with the existing social technical system, also influence actions that are not performed every day. They create the basis for what kind of action seems meaningful and causes similar actions to be performed in similar situations by large numbers of different individuals, as when all the homeowners in the Lolland case study had replaced their windows, but only one planned to install PV solar panels. I therefore argue that here we can identify a certain practice of dwelling among homeowners on Lolland consisting of specific meanings, materials and competences. My argument is not that practice theory can explain everything related to renovation and maintenance of private homes, but instead that practice in certain situations can contribute with new insight into the actions of the homeowners.

In this way I see practice theory as a good supplement to Ingold’s dwelling perspective as the strengths of this theory address the weaknesses of Ingold’s perspective. At the same time, practice theory’s strong aim of focusing on practices, not individuals, makes it difficult to include individual experiences and sense impressions into a practice analysis if a larger group of people does not share them. Ingold is also interested in shared practices, but, in relation to practice theory, Ingold goes closer to individual and personal emotions, hands-on experiences and imagination. Ingold looks into how these aspects also influence the actions and perceptions of the single individual, also in cases where they are not shared with many others. I therefore find that Ingold’s theory is able to fill out some of the holes I see in practice theory. However, one aspect that is not adequately included in either Ingold’s or Shove’s perspectives is how actions and perceptions of the homeowners are connected not only to local experiences, or the society they live in, but also to elements further away, on a global scale or in other social groups. Here ANT contributes with its perspective on how local, national and global aspects all interact through actor-networks. This, moreover, is a central point for ANT, i.e. that no borders exist between these levels; the global is always a part of the local and opposite. I will therefore now move on to ANT as the last theoretical perspective I have been working with.
A sensibility towards non-humans actors

As mentioned, Shove’s version of practice theory is to some extent inspired by Latour’s theory in its sensibility towards the role of things and technology. However, this mentioned, Bruno Latour’s actor-network theory presents a very different theoretical perspective than the one of practice theory. I therefore now present Latour’s actor-network theory followed by urban green assemblage theory that applies an ANT approach to understanding urban development.

No distinction between humans and non-human actors

ANT was developed in the 1980s in the work of mainly three people; the Frenchmen Michel Callon and Bruno Latour, and the Britain John Law (Latour 1987, Callon et al. 1986). ANT grew out of the developing field of science and technology studies (STS). The first ANT studies were interested in the scientific production of facts in laboratories. The main arguments were that scientific facts in hard science were to a large extent socially constructed (Blok and Elgaard Jensen 2009, Latour and Woolgar 1986, Latour 1988). Later, empirical studies moved outside laboratories and paid a general interest to the interrelations between humans, things and technologies. The subjects of study in years to follow ranged from how the Portuguese were able to keep their imperial power in the 15th and 16th centuries (Law 1986) to the cultivation of scallops on the north coast of France in the 1970s (Callon 1986). The common theme in these different studies was to include the agency of non-humans on the same level as the human actors when seeking to understand social transformations.

Today Latour is seen by many as the most central theorist behind this approach and ANT has more or less become synonymous with his name. I will therefore build on Latour in the following presentation of ANT. What really makes Latour (and other ANT inspired researchers) different from other sociologists, including most other practice theorists, is his way of not only including materiality, things and technologies in his theory, but placing them on a par with human actors. Latour uses the concept ‘actors’ for both humans and non-humans. Latour defines an actor as “any thing that does modify a state of affairs by making a difference” (Latour 2005:71). He asks, for instance, does it make a difference if you are hitting a nail with or without a hammer? Yes, it does make a difference. Things are actors in the sense that they cause other actors to behave differently than they would have done, had the thing not been there. Latour writes, “In addition to
‘determining’ and serving as a ‘backdrop’ for human action’, things might authorize, allow, afford, encourage, permit, suggest, influence, block, render possibly, forbid, and so on” (Latour 2005:72). In this way, according to Latour, there is no reason to make a distinction between human and non-human actors.

**A hybrid reality**

The concept ‘network’ is, in the same way as ‘actor’, used differently in Latour’s work than in most other social theories. Network is often used as the name for connections between human beings. Instead Latour uses network as a description for the way actors, both humans and non-humans, are continually connected in new ways and influence each other. A network is, he writes, “not made of threads, words or any durable substance but is the trace left behind by some moving agent” (Latour 2005:132). It is, moreover, important that Latour does not see networks as something tangible that you can go out and look for. “Network is a concept, not a thing out there. It is a tool to help describe something, not what is being described” (2005:131), Latour writes. With this he means that what we are looking for as researchers is the moment one actor “does modify a state of affairs by making a difference” for another actor. It is in these short moments we can observe the connection between actors. This means that between these moments no network exists. What we can look for is those short moments where one actor influences another. By observing these connections between actors, we are then able to draw up a picture of a network for analytical purposes. In this way, the network becomes an analytical tool, not something out there that we can observe.

Having described what Latour understands by a network and an actor, what is then an ‘actor-network’? Latour writes, “an actor-network is what is made to act by a larger star-shaped web of mediators flowing in and out of it. It is made to exist by its many ties: attachments are first, actors are second” (Latour 2005:217). In this way, an actor-network is both an actor and a network. It is the specific actor and all this actors’ connections. In Latour’s mode of thought you can never talk about an actor alone. An actor will always be attached to, made of, influenced by, or made to act by other actors around it. An actor is always an actor-network. This also means that an actor-network is always both social and material, as both humans and non-humans are a part of every actor-network. This make Latour further argue that we indeed live in a world of hybrids; meaning that we cannot name some part of the world ‘nature’ and other parts ‘society’. By seeing the whole world as made
out of actor-networks, or hybrids, Latour overcomes the separation between the social and the material.

**The modern constitution and the surprise of anthropogenic climate change**

At the beginning of the 1990s, Latour (1993) moves his theoretical point about hybridity on to a general critique of what we normally see as modernity. Latour defines modernity as the separation of nature from society, but in that sense we have never been modern, he argues (Latour 1993). We believe that we are modern as we believe that with industrialisation we have reached a point where we will continually become better at controlling nature. Latour calls this ‘our modern constitution’. The problem is just that it is not true. We have not been able to separate society from nature; instead we are just creating still additional and more complex hybrids. As Latour writes, “the more we forbid ourselves to conceive of hybrids, the more possible their interbreeding becomes” (Latour 1993:12).

It is with this part of his theory that Latour goes into the debate about climate change and other environmental problems most directly. Latour argues that our belief that society can be developed independently of its material context is the reason behind some of the major environmental crises we face today. Climate change and pollution are some of Latour’s own examples (Blok and Elgaard Jensen 2009, Latour 1998). Polluted oceans and cities and the present global temperature rise are ways in which we are shown that we do indeed live in a world of hybrids. Still, with these proofs in front of us, we keep holding on to our belief in the modern constitution. We believe that we can apply technological fixes to develop our way out of the problem, and that we are therefore able to continually develop our society without having to take oceans, animals, weather, air or other non-human actors into account. As I argue in the first article presented in this project, the reason why some of the people on Lolland are not worried about future climate change might not only be that they have not experienced the changes in their local landscape, as Ingold would argue. It could also build on a fundamental belief in this modern constitution; that humans will be able to control the sea and rain water to an extent where climate change will not have to affect their everyday life.

ANT provides us with a tool to include a broader range of both human and non-human actors into the analysis than both Ingold’s dwelling perspective and practice theory. With ANT, the limits for what actors to include becomes an empirical question more than something defined from the outset.
I will address how this has influenced my data collection in the methodological chapter later on. Latour’s theory has been found useful in many different academic fields and has therefore been further developed in different contexts. Urban assemblage theory is one example of a newer theory that has its roots firmly planted in ANT. Urban assemblage theory explores how ANT can contribute to urban studies. I therefore found this theory useful especially for the Copenhagen case study.

**Urban assemblages**

Ignacio Farías and Thomas Bender (2010) argue in their book from 2010 for the relevance of working with the concept of ‘urban assemblages’. They build their theoretical understandings mainly on ANT, but the assemblage concept can also be traced back to Deleuze and Guattari’s concept ‘agencement’. ‘Agencement’ is the French word for fitting together or arranging a number of different elements and Deleuze and Guttari use the word to describe connection between heterogeneous elements such as things, technologies, human bodies, symbols and so on (Farías 2010:14). By studying these ‘agencements’ or assemblages, it is possible to gain insight into how the world consists of multiple realities (Farías 2010). For Deleuze and Guttari, assemblages are relatively stable structures, at least over shorter time spans. This means that assemblages are something we can go out and find, and thereby study, and as such the urban assemblage theory, despite its roots in ANT, differentiates itself from Latour’s ANT. Latour writes about dis- andreassembling of actor-networks, but these networks are not something we can go out and find in any given moment. Moreover, Latour talk of ‘assembling’ as a verb, but in urban assemblage theory focus is on the noun ‘assemblage’ (Farías 2010). By in this way giving assemblages some kind of stable form, it also becomes possible to talk about the agency of an assemblage, not only the agency of the enrolled actors. When assemblages themselves have agency, we can take this further to understand assemblages as something being able to influence a situation (Farías 2011). I follow this theoretical perspective when arguing how different assemblages have pushed the development of Copenhagen climate adaptation in certain directions.

Farías and Bender argue how the urban assemblages approach can help to study cities as multiple assemblages, enrolling both human and non-human actors. They use ANT to move away from the ‘big explanation’ for developments, e.g. capitalism, that have dominated earlier within urban studies (Farías 2011). Instead, they argue how multiple realities exist side by side and how therefore several
explanations or stories can exist in relation to urban development. Anders Blok (2013) further develops this theoretical approach with his concept of ‘urban green assemblages’. Blok writes:

I define urban green assemblages as ensembles of heterogeneous actors, humans and non-humans, that orient themselves towards the practical redesign of urban eco-socio-technical relations in the direction of (some sense of) ‘sustainability’. (Blok 2013:19).

He argues how urban green assemblages are a useful tool to understand the (often surprising) developments of urban sustainability projects and green architecture. In the third article, this approach is used to argue how a number of different assemblages can be identified around the technology of local stormwater drainage. These assemblages can then be helpful to understand; firstly, different ways in which this technology is perceived and secondly, the controversies that exist in involving private homeowners in Copenhagen’s climate adaptation planning.

**Power to re- or disassemble assemblages or to keep them stable**

My interest is not only in how different human and non-human actors are, have been or can be connected, but also in what happens when these connections between actors remain stable over a longer period. Here the urban assemblage perspective has proven useful. What can make assemblages ‘freeze’ and thereby stay stable for a time? In this relation the concept of power needs to be discussed.

ANT has been criticised for not including the importance of power, as all actors are given similar ability to influence developments. Latour (2005) rejects this criticism, as he says that the power comes through the number of connections each actor has to other actors, both humans and non-humans, not the isolated power of an actor. Still, with Latour’s theory it is not possible to argue that some connections in themselves include more power than other. The question is whether this perspective of Latour allows the possibility of working with situations where some key actors seem to influence developments more than the majority of others, and possibly not only by their connections but also by excluding actors from certain assemblages.

Urban assemblage theory deals with power more explicitly, as it came into being by positioning itself against critical urbanism theory. In this aspect, it draws again on Deleuze and Guattari, as they in their ‘agencement’ concept argue how tracing connections between actors can be a way also to
trace relationships of domination. By studying the actual connections between heterogeneous elements, power might come into focus, not disappear, as the critique of ANT argues it does (Farías 2011). In this way, both Farías and Bender (2010) as well as McFarlane (2011a) argue how the urban assemblage approach has the potential to challenge existing power structures, by tracing often hidden exclusions or dominant relations.

Furthermore, Farías and Bender argue that as assemblages turn into reality by being enacted, this also means that every assemblage has an inherent potential for being different than it is. Other actors can be enrolled in the assemblage or the actors can be connected in new ways (McFarlane 2011a). The assemblage perspective, therefore, allows for imagining the world to be different than it is, and here lies an inherent potential for critique of the existing system. As a result, several urban assemblage studies have aimed to show not only present assemblages, but also how these assemblages could be different. Here, an important point is that each actor in each assemblage has the potential to create change (McFarlane 2011b, Coutard and Guy 2007). Still, this study and others show how some actors clearly have more power to overrule others and disconnect them from an assemblage than others (Blokp 2013). In the third article it is argued how it is important to identify actors which hold more defining or controlling power than other actors involved. The Copenhagen case study shows how key actors such as officials in the utility company and the city council have a defining role. This gives them both the power to ‘freeze’ some assemblages by defining what kind of future risk scenarios that are enrolled, as well as making the agency of some assemblages so strong that they overrule other assemblages.

The above demonstrates how urban assemblage theory opens up for working more explicitly with power as connected to certain actors, but also to whole assemblages. Latour’s perspective can help understand why some actors influence a large group of other actors, but not how some actors have the power to exclude other from assemblages, or to steer the agency of whole assemblages. Here, the perspective of urban assemblage theory is more useful, as it includes both how single actors but also full assemblages can exercise power.

After this introduction to my three theoretical approaches, I now explore the differences and similarities between them in more detail. I do this by discussing three different aspects that span them all; materiality, ways of imagining the future and, finally, stability and change.
Theoretical discussion of key concepts

Three different perspectives on materiality

The aim of this project has been to investigate the transitions that are taking place in private homes in response to climate change and climate change policies and how these transitions are motivated. This main question pivots, as mentioned, on the relationship between homeowners and their material surroundings. In this discussion section I therefore start with comparing the three different perspectives on materiality presented above.

I commenced this theoretical chapter by arguing that what the three theoretical perspectives have in common is the way in which they pay special attention to materiality. However, their understandings of the relationship between the social and the material are not similar. Ingold argues how we as individual human beings are a part of the landscape in which we live and how it is not possible to understand the development of societies or landscapes without seeing the connections between them. Shove, on the other hand, does not focus on this direct connection between individual humans and their material surroundings. Instead, she looks at how materiality, things and technology are involved in creating or transforming practices. Ingold is interested in materiality as something we can touch, see, smell and which therefore is directly a part of our experience of being in the world, whereas Shove’s interest in materiality is related more to the way materiality is a central explanation behind dominant social conventions and thereby practices. Latour’s perspective differs from both of the above, as his main argument is not to make any distinction between humans and non-humans, between society and materiality, at all. Ingold clearly states how there still is a basic distinction between humans and non-humans; that they differ in their way of perceiving, experiencing and imagining the world (2000:177). Also in Shove’s practice theory there is a basic distinction between materiality and humans. Materiality is a part of practice, but humans are not. They are instead the carriers of practices.

It is these different ways of including and working with materiality that make all three theoretical perspectives relevant for my analysis, as they enable homeowners’ responses and relations to their material surroundings to be examined in different ways and with different aspect in focus. Ingold can help to understand how materiality influences our perception of the world we live in. Shove
contributes with an understanding of how materiality shapes practices and, finally, Latour provides insight into the many different actors, both human and non-human, that are involved and connected in any given context. So, where Ingold connects the analysis to the very local, Shove looks at societies and Latour connects all levels from local to global in his network analysis and insists on not putting up any borders as to what is relevant to include.

**Two different perspectives on imaginations of the future**

Climate change is a problem connected to the future. Catherine Leyshon (née Brace) and Hilary Geoghegan (2012) argue how climate change is an ‘uncertain imminence’, meaning that the issue we are discussing today and seek to adapt to is something which is not predictable and can be understood differently in different social contexts. They, therefore, argue that adaptation plans and technologies can be seen as ‘anticipatory objects’, as objects which attempt to present a solution to unknown future problems. The way different people imagine future climate change is therefore key to any study that is interested in responses to climate change. In the first and third articles, I especially discuss how homeowners’ imaginations shape their perception of their own risk, and thereby the adaptation actions that they find meaningful. Ingold’s dwelling perspective and urban assemblage theory both explicitly include a perspective on imagination.

Ingold argues how our imaginations of the future issue from our personal and local experiences. We therefore imagine future climate change on the background of our past and present experience with the weather and local landscape changes. A criticism of Ingold’s imagination concept, which can also be extended to his theory as a whole, can be that it does not take wider social conventions and understandings into consideration. In the context of the first article, as mentioned above, I found it necessary to supplement Ingold’s theory with the one of Latour, to argue that firm belief in the human ability to control nature influenced how some of the homeowners in the Lolland study imagined the effect climate changes will have on their local landscape. In some cases this belief actually overruled personal experience which revealed the opposite; i.e. that the natural environment could not always be controlled.

Unlike Ingold’s, urban assemblage theory does not look at the imagination of the individual human being, but argues instead that an assemblage perspective paves the way for understanding why we imagine the future as we do, and also for how we can imagine the future to be different. In this way,
assemblage theory moves the interest from how imagination stems from personal experience to how imagination is embedded in assemblages containing a wide variety of actors. Here, imaginations of the future come from how these assemblages are connected in the present. This means that factors other than changes in local landscapes and similar local matters are taken into account. Discourses, social conventions, as well as abstract scientific knowledge can therefore play as large a role as local weather events. In the third article it is, in this way, argued that many factors other than personal experiences influence how future climate change is imagined and responded to.

Practice theory is concerned with the more or less routinised actions of people, not the thoughts and feelings that cannot directly be connected to actions. Therefore, imaginations of the future do not play a large role in this theory. Of course, expectations of the future influence how a practice is given meaning, but as this is never explicitly discussed I decided to build my understandings of imaginations of the future on the two other theoretical perspectives instead, which I explain further in the section about risk perception.

Three different perspectives on stability and change

An aim for most environmental sociology is to contribute to a lesser or greater extent to sustainable transition of society. Therefore, the question of what creates stability and change is central to most theories, as well as studies. This is also the case in the three theoretical perspectives I am working with in this research project. For all three, performativity is a central concept, and both stability and change are explained through a view on the social as something we continually perform. However, their disparate theoretical perspectives make their focuses and understandings very different.

Ingold looks at the world as being in constant transformation. This perspective has its limitations, as discussed above. With Ingold’s theory it is difficult to explain why something can in any case remain stable. ANT and urban assemblage theory have also their main focus on transformation. They argue how connections between actors are continually made and broken. ANT sees constant transformation as the ‘normal’ situation and stability as the thing that should raise curiosity and thereby be something we seek to explore empirically. Latour (2005) argues that the main reason that some kinds of stability exist is the inertia in materiality. Society as a whole cannot change from one day to another, as this will depend on large material transformations. Urban assemblage theory contributes more to understanding stability than classic ANT. Here stability is not only connected
to materiality, but assemblages in themselves are seen as able to be relatively stable and unchangeable, at least for a certain time span. Still, the strength assemblage theory, is to explain how assemblages are created and transformed, not so much why they sometimes stay the same. Here, practice theory then becomes a strong tool as unlike the other perspectives it focuses in particular on understanding and explaining stability. Materiality is also given a key role in practice theory, but combined with more social or combined factors, such as social conventions and socio-technical systems. The perspective of practice theory can therefore also contribute to the other theories. For instance, a relevant question is how social convention and socio-technical systems can play a role in ‘freezing’ some assemblages and keeping them stable. Also socio-technical systems can explain why humans sometimes are not able to adapt to changes in their local landscapes, where Ingold argues that they always will be able to. Infrastructure such as roads, electricity cables and sewerage systems makes it much more difficult to move a city a few hundred metres further away from the sea or up a mountain, as might have been the response to increasing flood risk in earlier days.

A final point in this connection is the role of power; who and what have the power to create stability and change? In the third article it is argued that some actors exercise more influence in defining which assemblages it is that obtain defining power. In this connection the practice theoretical approach also points us in some relevant directions, as empirical study can explore who in different situations can influence the development of different socio-technical systems and thereby the development of social conventions.

On the background of these discussions of the similarities and differences between my three theoretical perspectives, I now relate them to my research questions and show how they contribute in different ways to my analytical framework.

**Theoretical reflections on research questions**

Here, I look at my three research questions in turn and argue how the theoretical perspectives presented above have shaped how I decided to approach them.
Understanding backgrounds for risk perceptions

Research question 1: How do homeowners perceive their own lives, their households and their local area in relation to the effects of climate change?

Risk perceptions are a central aspect in this research project. I build my theoretical understanding of risk mostly on Ingold’s theory, together with Catherine Leyshon (née Brace) and Hilary Geoghegan’s (2012) concepts of anticipatory objects and uncertain imminence. Also ANT has provided input to how I understand the concept of risk. However, none of these theories directly discuss the concept of risk perception. In the following I therefore argue how in spite of this they can in any case create the foundation for my understanding of this issue.

The concept of risk has shifted in recent decades from being understood only in mathematical terms as the probability of an incident occurring to also being seen as subjective understandings that are often are built on embodied cultural values and beliefs (Jasanoff 1999). Several theories and studies argue that the experience of certain risks can vary from culture to culture and from person to person (Jasanoff1999; Douglas 1992; Beck 1992). This means risk perceptions have to be seen in connection with their specific context, and they are shaped as much by public discourses, media attention, everyday life and personal experience as by calculated numbers (Jensen and Blok 2008).

This relates to Ingold’s argument that understandings and concerns about climate change are for most lay people more a result of personal and local experiences with landscape and weather than scientific climate models. According to Ingold’s theory, risk perceptions can be seen as issuing from people’s everyday and hands-on experience with their local landscapes. Ingold also argues that this can be a problem when looking at risk related to climate change, as this is a future risk that is still not perceivable to most people. Leyshon and Geoghegan (2012) further relate this not only to weather and landscape changes, but also to how things and technologies can play a role in representing and shaping different images of future risks. When things and technology are installed in response to a future expected change in climate, they become anticipatory objects and thereby become inscribed with some specific expectation of the future. Thereby, they can also be seen as having a role in shaping this coming future and the risk connected to it. As the water-managing technologies, such as dikes and pumps, on Lolland show, this can mean that some landscape changes go unnoticed, but also that the technologies become inscribed as the solution to future flood risk; with the result that this risk is now moved from the realm of humans to that of technology.
Latour supports this perceptive that risk perceptions can be built on many other aspects than personal experience, and he too focuses in particular on the role of technologies. However, he takes the argument one step further when he argues that our belief in the modern constitution, the separation of nature from society, in many cases is so strong that even though in the present we experience floods and other natural disasters, we are still able to imagine a future where this kind of incident can be avoided by means of technical solutions. In this way we should not only look at local experiences as the basis for risk perceptions, but include all types of actors which can influence images of the future and confidence in various technologies. What factors have the greatest influence on risk perceptions in different contexts is an empirical question. I attempt to address this in my first article on Lolland and my last article on Copenhagen.

**Understanding backgrounds for climate adaptation actions**

Research question 2: What makes homeowners adapt their private homes to climate change?

I am interested in what overall can influence homeowners’ actions in relation to their properties and local areas. Here, I build my analysis to a large extent on the understandings of Shove’s practice theory. I see many of things people do to and in their homes not as a result of carefully made decisions but as something that can be characterised as practices. In the second article, I argue that many renovation or maintenance actions are better understood not only by looking at decision making, but also by focusing on they to a lesser or greater extent routinized and embodied practices. Shove directly challenges that actions in most cases can be connected to values or economic incentives, and, as such, her theory changes the way humans actions have mainly been regarded and understood, especially among policymakers. According to her arguments, actions cannot be studied alone by looking at people’s values and decisions. Instead we have to take a step back and look at all the other factors that also shape and set the limits for actions; these being materiality, competences and socio-technical systems. This of course makes research more complicated, but my empirical findings have clearly shown it necessary to include this complexity in order to approach an understanding of what drove the actions of the homeowners in the study. It became clear that something more than economic rationality or environmental values were at play.

As mentioned, practice theory and ANT can be seen as operating on two different levels, and the perspective of ANT is therefore no less relevant in relation to my understanding of actions than it
was to my understanding of risk perceptions. The main focus of ANT and urban assemblage theory is to follow how the actions of one actor influence a number of other actors. Here actions, and not understandings, perceptions or values, are key. ANT provides a tool to analyse how the actions of one single homeowner are connected to a number of other actors; both humans and non-humans. In my first and my third articles, I use the understandings of ANT to zoom out from the practices of the individual homeowners, and connect their actions to the actions of policymakers, the weather, new technologies and other factors.

Finally, I should also mention here my inspiration from Ingold. Personal experiences with local landscapes do not only shape understandings and perceptions but also actions. Ingold sees dwelling as something we continually perform, and through this performativity we adapt to changes in life situations and local environments. In my first article I therefore include the directly sensed relationship to the local landscape of Lolland in my understanding of the homeowners’ action or lack of action in relation to climate change.

**Understanding backgrounds for the effects of climate politics**

Research question 3: Do climate change and climate change policies affect the transitions that are taking place in private homes?

This research question can be split into two. The first part concerns climate change as this global and rather abstract concept Ingold defines as the scientific perspective and the second part concerns climate policies.

In relation to the connection between global climate change and transformation in private homes, I build my understanding on Ingold’s perspective, that it is important to have a sensibility towards the differences between experiencing weather changes and having the knowledge about global climate change. In this way, I find it relevant to explore whether transformations taken place can be related to a more abstract knowledge about climate change, or only to experiences with local weather and landscape changes. Further is Latours concept of ‘the modern constitution’ again interesting to include in this relation, as a belief in that we can apply technological fixes to develop our way out of future climate problems, can mean that knowledge about global climate change is less likely to be enrolled into homeowners practice of dwelling.
In relation to climate policies, as mentioned in the introduction, my aim has not been to undertake a policy analysis. Instead, I have been interested in how policies, among many other factors, are able to influence perceptions and actions of homeowners. However, one question I find relevant to highlight in connection with policies is that of the extent to which we can look at climate policies as ‘just’ one of many actors influencing the responses of homeowners? Some of the findings from the third article indicate that at least in some cases, policies and policymakers have a greater defining power than other actors. Latour’s argument that the reason for this can be found in larger networks gives a useful explanation, but still I will argue that it is relevant in most environmental sociology analysis to give special attention to the power of policies. As mentioned, I will argue that policies often hold special powers to stabilise or transform certain assemblages, and thereby influence developments to a larger extent that most other actors involved. In the second article I follow this line of thought when exploring the extent to which existing policies influence different assemblages, and thereby the actions of homeowners. As I found the influence of the policies to be limited, I explore the reasons for this instead.

To conclude this chapter it is relevant to go back to the motivation for this study; to gain knowledge about how private homes can be better adapted to climate change. Climate policies are one of the most important tools in this regard. A central aim of this study is therefore to improve the knowledge about how climate policies can use their power to actually influence transitions in private homes. In this sense, the main message from this theoretical discussion is that political focus should be extended from not only changing values or influencing decisions but looking at the practice of dwelling as a whole and how this is connected to other actors on all scales from local to global.
Methods

Analytical framework

The theories presented above create the basis for my analytical framework and, through this, my research design. ANT is as much a methodology as a theory as it is concerned with providing a framework for how to study complex social situations rather providing theories that explain these situations or how they are developed. ANT has therefore especially shaped my methodological choices, but the focus on practices and everyday experiences in Shove’s and Ingold’s theories have also played a role here. Overall, especially three aspects have been used in creating my analytical framework: 1) The sensibility towards materiality and the inclusion of all kinds of non-human actors into the analysis, 2) The understanding of multiplicity. There not only being one ‘big story’ or ‘grand theory’, but always several stories about and perspectives on the same issue with ensuing, giving rise to controversies, and 3) The explorative approach, whereby the aim is to study connections and developments in a complex world rather than verifying or falsifying hypotheses.

Adele E. Clarke (2005) has developed what she names ‘situational analysis’ to work with this kind of analytical framework and has therefore provided useful inspiration and tools for my analysis. She builds her perspective on Latour’s theory, among several others. She argues that if we seek to be able to address the complexity and constant transformation in the world we live in, the best method is detailed and explorative qualitative studies. She suggests that everything has to be understood through how it is connected to other elements and that situated analysis is a method by which those connections can be explored. As Latour, she argues that the aim is to trace and uncover networks between both human and non-human actors. By studying these connections or networks, we are able to find, often surprising, connections and be open to inclusion of actors that in other analytical approaches might be overlooked. Here, she is referring in particular to ‘silent’ actors, such as things, technologies and human actors with no public influence. By means of a method she names ‘mapping’, which I will return to later in this chapter, she argues for tracing these connections throughout the whole research process, from designing the study, through data collection and into the final analysis. By continually mapping all the actors or elements that are involved in the situation in focus, and the connections between them, it become possible to trace how different
actors are included or excluded from different situations, and how this shapes how the situation develops.

With this focus on complexity and connections between elements she further shares the perspective with Ingold, Shove, Latour and urban assemblage theory that a situation is never independent from its surrounding environment. Instead, it is a part of it. She writes:

> The conditions of the situation are in the situation. There is no such thing as “context”. The conditional elements of the situation need to be specified in the analysis of the situation itself as they are constitutive of it, not merely surrounding it or framing or contributing to it. They are it. Regardless of whether some might construe them as local or global, internal or external, close-in or far away or whatever, the fundamental question is “How do these conditions appear - make themselves felt as consequential – inside empirical situations under examinations?” (Clarke 2005:71)

This quote illustrates my methodological perspective very well. I seek to understand climate change, not as “a context”, but study how it is or becomes an element of the situation I am looking at and in this way becomes a part of actions and perceptions of the homeowners. I seek to explore how non-humans and humans become connected and become a part of each other in the situation created by climate change.

**A case study approach**

Clarke (2005) writes that for studying the complexity of the world you need to make detailed studies of specific situations. It is in specific situations that you can study how elements or actors become connected and that you can understand how meanings are constructed. Gary Thomas (2011) writes how undertaking case studies is to study a specific situation or event. In a case study you decide to study a specific subject with the aim of understanding a situation or development in more detail (Thomas 2011:14). Case studies make it possible to explore an issue in depth and are often used in situations where the explorative is more important than generalisation (Thomas 2011, Flyvbjerg 2006, Hammersley and Atkinson 2007). On this basis, I decided that a case study approach would be the best method with which to study the complexity surrounding climate adaptation of private homes in different contexts.
Argument for selection of the case studies

In my search for relevant cases I looked for some which could provide good insight into the way homeowners related and responded to climate change. My expectation was that making material changes to a home as a response to climate change or climate change policies is not something that most people do. It is still relatively unusual. Therefore, picking a random case or pursuing a case that does not have any particular characteristic could make it difficult to obtain any interesting findings. As Bent Flyvbjerg (2006:229) argues, “the typical or average case is often not the richest in information”. I followed Flyvbjerg’s approach and looked for what he names extreme or deviant cases, meaning unusual cases where the issue studied might prove especially problematic or especially good (2006:230). I aimed at identifying cases where it could be expected that the homeowners were more likely to think about or take measures to adapt to climate change. However, on the other hand, I was not looking for very extreme cases, such as people living in areas where flooding have forced them to leave their homes, or, for that sake, people living in communities with a particular emphasis on sustainability or who in other ways have made environmental or climate issues central to their lifestyle. Helle Neergaard (2007) writes how this kind of very extreme case can at times have the problem of being so unusual that it distorts the phenomena in focus in the study. She therefore argues that at times what she calls ‘an intensive case’ should be found, not an extreme case. Intensive cases are cases that are rich in information by manifesting the phenomena in an intense, but not extreme way (Neergaard 2007:25). In light of this, I looked for a case that involved average homeowners, but who had an especially intense relation to climate change issues by living in areas vulnerable to climate change. With this, I hoped to be able to gain insight into how homeowners would respond and had responded to climate change. A further motivation for choosing this kind of case was an assumption that more homeowners will be living in climate change vulnerable areas in the future, but still without being especially engaged in climate change issues. I therefore hoped that by studying this kind of case I would be able to contribute with knowledge that could be relevant in relation to a broader group of people. On this basis, I selected two cases; firstly, a case study of owners of a number of one-family houses on Lolland and secondly, a case study involving a housing cooperative in Copenhagen.

Lolland is a coastal municipality and one of the lowest areas in Denmark. The largest town, Nakskov, has been designated a high-risk flood area in the risk assessment report dictated by the EU directive on the assessment and management of flood risks (Miljøministeriet et al. 2011), commonly called the EU Flood Directive. Throughout history, Lolland has regularly experienced
extensive flooding. I therefore expected that people on Lolland would be worried about climate change and feel that there was a need for adopting adaptation measures. That this turned out not to be the case is discussed in the first article.

Copenhagen is the capital of Denmark and over the last couple of years has experienced a number of damaging cloudbursts and storm surges. These events have shown the vulnerability of the city towards extreme weather events and thereby climate change. I expected these weather events to have made residents especially interested in designing and implementing adaptation measures.

I did not choose the cases to be comparable, in the sense of being similar with only a few central differences that then would become the centre of the analysis. On the contrary, I chose them to be as different as possible. Copenhagen municipality is the city council for most of the capital of Denmark. Lolland municipality, on the other hand, covers a big island with low population density and one of the lowest average incomes in Denmark (Juul 2012). By means of these cases I am therefore able to say something about risk perceptions and adaptation actions in two very different contexts. Furthermore, their differences make it possible to discuss how specific contexts influence the actions and perceptions of the homeowners, by examining the similarities and differences in the cases. Several times during the research process, questions raised in one case led to new findings in the other. I have therefore used the differences between the two cases to broaden the explorative potential of this study.

Presentation of cases

Lolland municipality

Background information

Lolland Municipality is located in the southern part of Denmark. It covers 893 km$^2$ and has 44,436 inhabitants. The population density is very low, only 50 residents per km2, in comparison to 130 in Denmark on average (figures from 2013) (The Ministry of Economic Affairs and the Interior 2014). Nakskov has about 12,866 residents (Danmarks Statistik 2014). Lolland is one of the parts of Denmark often described as peripheral Denmark (‘udkantsdanmark’), which is the term used for the areas furthest away from the larger cities and where in recent years there have been growing problems with people moving away, job maintenance and creation, and falling house prices.
Vulnerability to extreme weather

Large parts of Lolland are located under sea level and one sixth of the land is drained through the use of pumps. Two thirds of rainwater falling in the municipality is pumped into the ocean (see Figure 1). The municipality of Lolland has experienced a number of very damaging floods in the past. The latest in the form of a storm surge in 2006, where sea level rose up to 1.6 metres above normal (Nielsen og Huess 2008) resulting in damage totalling more than € 2.5 million (Stormrådet 2009).

The municipality is well aware of this challenge and writes in their municipal plan for 2010 to 2022, “Lolland is one of the areas in Denmark which is expected to be most affected by climate change” (Lolland Municipality 2011). They further state in their climate and energy strategy, “When adapting to climate change it is necessary to take into concern rising sea levels and more storm surges, and also more precipitation and cloudbursts. This is especially relevant for Nakskov (…)” (Lolland Municipality 2012). Some parts of Nakskov are located below sea level and are protected by dikes. In the rest of the town pumping stations are required to keep the ground dry. Nakskov is,
as mentioned, one of ten areas in Denmark identified as having the highest risk of extensive losses from extreme floods in EU Flood Directive (Miljøministeriet et al. 2011). Figure 2 shows the areas of Nakskov which are calculated to be at risk of being flooded in the case of storm surge.

Some of my interviews were performed in Onsevig, a small village on the north coast of Lolland. The storm surges in 2006 hit especially hard here. More than half of the homes in the village were flooded and in the houses worst hit the water inside was up to half a metre. After this, the village had a dike built around it, significantly reducing the risk of a similar flood experience.

However, this shows how Lolland is indeed vulnerable to the effects of climate change, understood as rising sea levels and more and heavier rainfall. Many other areas are as low-lying as Onsevig or need pumps for drainage. This means that a larger number of homeowners have their properties located in areas where floods are more likely to occur than in most other places in Denmark.

Figure 2: Map from the risk assessment report dictated by the EU Flood Directive (Miljøministeriet et al. 2011)
Copenhagen municipality

Background information

Copenhagen municipality covers the largest and most central parts of the capital of Denmark. Around 559,440 people live in the municipality, which covers 90 km² and has a population density of 6,184 residents per km² (figures from 2013) (The Ministry of Economic Affairs and the Interior 2014). The density of the population means that a considerable number of people and economic activities are affected when even small flood incidents or other types of extreme weather conditions occur. Also, Copenhagen has as a goal not only to adapt the city to climate change, but also to lead the way globally within green technologies and solutions. The city aims at being the first CO₂-neutral capital in 2025 (The City of Copenhagen 2012b), and in general show how both mitigation and adaptation solutions can be integrated into urban life to create greater livability for the residents (The City of Copenhagen 2011).

Vulnerability related to extreme weather

In Copenhagen’s Climate Adaptation Plan it is stated that on the background of the latest scientific results, three different threats to Copenhagen and its inhabitants are expected in relation to climate change; more and heavier rainfall, rising sea level and generally warmer weather (The City of Copenhagen 2011).

Meteorologists expect that precipitation will increase by 25-55% during the winter and will decrease by up to 40% in the summer. (…) Thundery showers will become 30-40% heavier while at the same time there are longer periods of drought between them (The City of Copenhagen 2011:5).

Further is stated:

Based on the current estimates, we expect that the sea around Copenhagen will rise by up to one meter over the next hundred years. If this happens the water level during a storm will be even higher than we experience during a storm today (The City of Copenhagen 2011:8).

In light of this, Copenhagen City Council expects to face an increasing flood risk, both from rainfall and sea level rise (se figure 3 and 4). The dimensions of this challenge have been clearly illustrated by the cloudbursts and storm surges experienced in the last few years.
In August 2010 a cloudburst poured 90 mm of water over Copenhagen and the northern part of Zealand in a few hours. Numerous basements, restaurants and shops in Copenhagen were flooded and several roads closed (Nielsen 2010). The year after, in July 2011, another and much heavier cloudburst hit Copenhagen. In parts of the city up to 177 mm of rain fell in a few hours. When the cloudburst was most intense, rainfall was measured at more than 3 mm per minute (Vejen 2011). Large areas of the city were flooded, roads closed for several days, railways were undermined and the incident resulted in expenses to insurance companies of €65 million (Forsikring og Pension 2012a). The event was defined as at least a 100-year event by the Danish Meteorological Institute (Andersen 2011). Still, yet another cloudburst of almost the same magnitude, up to 134 mm, hit Copenhagen on 31 August 2014. Moreover, 6 December 2013 Copenhagen experienced a storm surge which was categorised as worse than a 100-year event. Here the water level in the harbour rose to 1.69 metres over normal sea level.
The high population density, the percentage of non-permeable surface and the fact that most areas serve several functions present some specific challenges for adapting Copenhagen to climate change and, as the recent cloudburst incidents have shown, make Copenhagen more vulnerable to extreme weather conditions. This means that currently the majority of private apartment buildings and homes in Copenhagen are at risk of being flooded in extreme weather.

The housing cooperative A/B Park in Copenhagen

In Copenhagen I decided to focus on one housing cooperative, A/B Park, and the residents’ work to implement a large local rainwater handling project. In an urban context housing often consists of apartment buildings rather than single-family detached or terraced houses, and involves different forms of occupancy, ownership and legal responsibility for the inhabitants. In Copenhagen apartment buildings mainly comprise condominiums, rented housing and housing cooperatives. The latter is of a type common in Nordic countries (Danish: andelsboligforening). Apartment occupants have shared ownership of the building in which they live and decisions regarding building maintenance are made at annual general meetings for all members and during the year delegated to an elected executive committee. The housing cooperative used as a case in this study, A/B Park,
with around 500 apartments, is quite large for its kind. Management of A/B Park is in the hands of an executive committee consisting of nine residents elected at the annual general meeting.

When I came into contact with the housing cooperative in the autumn 2012 they were in the process of launching a project involving handling stormwater locally (in technical terms called a SUDS (Sustainable Urban Drainages Systems) project). With the project, A/B Park planned to collect rainwater from roofs and use it in toilets and washing machines as well as to install soakaways and create green areas in the courtyards to drain the remainder of the rainwater directly into the ground. This would make it possible to disconnect A/B Park’s rainwater system completely from the public sewerage system. The (at the time) newly elected executive committee of the housing cooperative had a further ambition more broadly of pursuing a green development strategy. Especially the chairman was very engaged in this plan when I talked to him in September 2012. I therefore found it relevant to follow this housing cooperative and their rainwater project as an example of how urban homeowners perceive climate change and their own risk, and how these perceptions can turn into concrete adaptation action. However, in the 1.5 years in which I followed A/B Park the project did not become a reality and currently looks as if it never will. In the third article the reason for this is explored and discussed.

How to study perceptions and actions of homeowners

The aim of a case study approach is to look at a situation in detail, from different perspectives and with the help of several kinds of information (Thomas 2011). This means that a variety of methods are often applied. In this study I use three; observations, interviews, and reading relevant strategies and plans.

There is a tendency to look at interviews and observations as radically different types of method. Interviews are seen as best to gain knowledge about people’s thoughts and beliefs, and observations to gain knowledge about what people actually do. This means that observations are seen as best for studying the actions of people (Atkinson and Coffey 2003, Halkier Forthcoming). My understanding, reached as a result of my analytical framework, differs. As a researcher, I see myself as the one that traces and uncovers networks, but, at the same time, I am also a part of the situation I study. I do not believe that that borders can be set up around a situation in a way that can place me outside. This means that I also actively have to include my own connections to and thereby
influence on the fields I study. My presence will to some extent unavoidably influence what is going on, and this is the case both in interviews and observations. As Bente Halkier (Forthcoming) and Poul Atkinson and Amanda Coffey (2003) argue, in this light, it becomes impossible to look at observations and interviews as fundamentally different, as in neither one nor the other would I be able to study actions as they would unfold without me being present. On the other hand, this does not mean that I cannot study actions or perceptions, just that I always need to take the specific data collection situations into consideration when I analyse my data. Seeing this from a positive angle, this can be further taken to mean that actions cannot only be studied through observations, but also through interviews. My argument is that obtaining good data does not so much depend on the methods used but more on how the data are placed in a context.

This is especially relevant for the practice theoretical approach. Here, researchers in several cases have often been challenged with regard to the validity of studying practices through interviews. Halkier (Forthcoming) argues that as practices comprise both ‘doing’ and ‘saying’, they might be as relevant to study through interviews as observations, so long as the specific context is always included. Furthermore, Halkier argues how, in fact, observations and interviews are often difficult to separate in the actual data collection situation. In interview situations, observations of the setting can be made or interviews can be combined with asking the interviewees to give a tour of their home, kitchen or neighbourhood. These observations will then also become a part of the interview process. In the same way, interview-like situations often arise as a part of observations (Hammersley and Atkinson 2007). In light of this, it can be argued that selection of method should not so much be a question of whether actions or thoughts are the main focus, especially as these cannot be separated anyway according to practice theory. Instead it should depend on the overall focus of the empirical research and what is feasible in different research situations (Halkier Forthcoming, Atkinson and Coffey 2003, Thomas 2011). In the case of people owning single-family homes, it was not possible to be present in all the everyday situations where bigger and smaller issues concerning their homes were discussed. Therefore, interviews seemed the best method to apply here. In the case of the housing cooperative in Copenhagen it was possible for me to sit in at their meetings and observe discussions about renovation and maintenance of the buildings. Therefore, observations were a good solution here. My choice of different methods has consequently not been so much to do with ‘triangulation’ in the more classic sense as a methods to looking at different aspects of a situation, but more about what is possible and relevant in different situations. In both observations and interviews, I focused in a similar way on both actions and
perceptions through my interest in how the homeowners framed experiences, understandings and actions (Clarke 2005). In the cases where I was able to use observations as well as interviews, the data could be further elucidated, as both methods focused on the same issues (Hammersley and Atkinson 2007:102). I will now explore the three different methods I have used in greater detail.

**Interview methods**

James A. Holstein and Jaber F. Gubrium’s (1995), with their ‘active interview’ methods, aim to develop a method which builds on the same understandings of the potentials and challenges of qualitative methods as Clarke, and which therefore supports my methodological approach. Holstein and Gubrium criticise, as do Halkier, Atkinson and Coffey, what they call the traditional approach to interview studies; that through the interview situation knowledge is transferred non-mediated from interviewee to interviewer (Holstein and Gubrium 1995:7). Instead, they argue that “all interviews are interpretively active, implicating meaning-making practices on the part of both interviewers and respondents” (Ibid:4). Meaning is created in the situation and in the relation between interviewer and interviewee. In a traditional interview approach, the aim of the interviewer should be to stay as passive as possible so as not to influence the replies given by the interviewee. In this newer understanding of the interview situation by Holstein and Gubrium, the neutral role of the interviewer is seen as impossible, but this does not now mean that relevant knowledge cannot be gained from interviews. Instead, following Holstein and Gubrium, it opens up for a more active role for the interviewer. The role of the interviewer now becomes to actively activate, stimulate and cultivate the views and interpretations of the interviewee (Holstein og Gubrium 1995, 17). By this, the aim is to get closer to the respondents’ various, and sometimes conflicting, perceptions and understandings, and also actions. By asking the respondents to clarify, reflect upon or even analyse their own understandings and actions, it is possible to bring more perspectives into play and thereby gain a better insight into the issue discussed.

In my research design I have built on this understanding of the opportunities and aims in interview studies. As a result, in all interviews I used a semi-structured interview guide, meaning that I did prepare questions for each interview, but more as checklist than a recipe I needed to follow step by step. I sought to have the interviewees talk about certain issues, but at the same time be open for new stories or unexpected turns in the meaning. I focused especially on following up on earlier
responses or stories, asking for further details, and suggesting explanations to hear their opinions about my interpretations.

During the study I performed several different types of interview; one-off interviews with homeowners, interviews building on earlier observations, and both one-off and repeated interviews with people working professionally with climate adaptation. Despite using the active interview method in all cases, I planned and approached the interviews differently in the different situations. I will therefore now present these separately.

**One-off interviews with homeowners**

In connection with the interviews with homeowners on Lolland I further found inspiration in the methods of life story interviews. In a life story interview the interviewee is requested to tell their life story in chronological order and in their own words. The aim of the researcher is to influence the way the story is told and what is included in it as little as possible (Atkinson 1998). This method therefore goes against the understandings of Holstein and Gubrium, who would challenge this aim as unrealistic. Still, I find these two approaches both possible and relevant to combine. I used the life story approach in the first half of the interview as I asked the homeowners to tell me about their time in and work on the house in chronological order. I commenced the homeowner interview by asking when they moved into their house and why, followed by asking what was the first act they did to their house, and the second, and so on. I concluded this part of the interview by asking if they were planning any larger changes to the house in the future and what they would like to do if money and time were no object. I had two aims with this part of the interview. The first was to see what kind of things and stories became a part this house’s life story by means of this very open questioning technique. I gained greater insight into what kind of actions the homeowners themselves saw as most important and relevant in relation to their homes than if from the start I had asked detailed questions about adaptation measures and energy efficiency. The second was that by asking the homeowners to focus more on actions performed in the past than actions they would like to do, I could gain insight into how they in reality had used their time and money on their house, more than what their values say they should have used these on. By eliciting these house life stories I aimed to obtain a broader picture of the actions of the homeowner, to which I could then relate the climate change responses that were my main interest. When contacting the interviewees I told them I was interested in material changes within private homes, but with an environmental focus. This
most likely caused the interviewees to bring environmental issues more into their stories than they would have done otherwise. Still, my experience was that starting out with the life story questions let the interviewees understand that my interest was broader than only, say, mitigation or adaptation related actions, and therefore talk more freely about all the acts they had performed on their houses.

After the house life story part of the interview I applied a more active interview technique by asking a number of questions about experiences with floods, perceptions of living in a risk area, perceptions of climate change and interest in saving energy – to the extent that such questions had not already been addressed during the first part of the interview. In many cases I asked the homeowners to reflect upon or go into more detail about issues they had brought up in first part of the interview.

The semi-structured interview guide I used was continually developed and improved during the fieldwork, as each interview gave me new insight into issues I needed to include or questions which needed to be phrased in another way (see final versions in appendix). This means that the questions put in the first interviews are not precisely the same as the ones asked in the later ones. In this way, development of the interview guide documents the analytical development that took place during the fieldwork as actors or whole areas of interest became connected to the issue in focus. This development is unavoidable in the kind of methodological approach I have chosen, where the aim is to trace networks, not verify or falsify hypotheses. However, it could have been fruitful to return to some of the first homeowners I interviewed with the questions that developed out of the later interviews, but I decided this would be too time-consuming in relation to what would be gained. This has meant, though, that at times I have met with the challenge in the analysis that a number of central issues were only discussed in the latter interviews not all of them. Among these are the homeowners’ knowledge about and perceptions of being dependent on dikes or pumping stations. It was not until after several interviews that I became aware of how much these technologies were taken for granted, and that some of the people first interviewed were presumably paying to a pumping station or dike cooperative, even though they had not mentioned this in the interviews.

**Interviews building on observations**

In the Copenhagen case study I started by observing a number of meetings in the executive committee before carrying out interviews with some of the committee members. I, therefore,
already before the interview stage had a good idea about past and present actions of the committee and what the individual committee members found important. This meant that I applied a more active interview role from the outset, as the observations had given me a number of questions I wanted to discuss and have further explained during the interviews. I started out with the same questions as on Lolland, about when and why they had moved into their apartment, but I proceeded more quickly to direct questions about what they liked, dislike and would like to change in and around the housing cooperative, and why. Also here, I concluded the interviews with questions about experiences with floods, especially the one in July 2011, perceptions of climate-related risks and interest in saving energy.

**Interviews with people working professionally with climate adaptation**

In the last type of interview with people working professionally with climate adaptation, the interview approach differed again. Here I was less interested in their personal perceptions, but more in the perspectives and strategies of the organisations or companies in which they worked. I wanted to know how these organisations and companies were handling climate change; what kind of climate change risk they saw, how they prioritised different risks, what projects were planned or already implemented, and how they saw the role of private homeowners in this work. Before the interviews I had read all the information I could find on the relevant homepages and in published plans and strategies. This meant that the interview guides were designed specifically for each interview and the questions I asked involved different ideas and projects, and were not so open as in the two first types of interview.

**Observations**

In the Copenhagen case study a large part of my data has been collected through observation. The observations were made by attending meetings of the executive committee and general meetings for all residents in the housing cooperative. I did not participate in the discussions, instead I just listened, as my main aim was to gain knowledge about what kind of issues were being discussed and how. At the first couple of meetings I was very aware of the way in which my presence seemed to influence the meeting and the discussions. A few times during the fieldwork I was drawn into their debate, with comments such as “don’t write this down” or “what does the researcher now think
of us?” but overall my feeling was that my presence did not keep any issues from being discussed or any committee member from expressing their opinion. The agenda was always prepared beforehand by the secretary of the housing cooperative, and did not change because of my being there. The atmosphere at the meetings was in general relaxed and I did not feel this change when I entered or left the room. Finally, all committee members knew about the focus of my project, but climate change and environmental issues were rarely discussed or brought into the discussions at the meetings I attended. I see this as a sign of that my presence at least did not bring these issues more in focus than normal.

During the meetings I took notes by hand, and after I came home wrote them out in more detail. In these field notes I included not only the topics discussed but also the various arguments, who had which perspectives, and the general atmosphere of the meeting.

In the interviews with homeowners on Lolland I also used a limited number of observations, as the first thing I did when visiting them was to ask them to give me a tour of their house. I did not ask them to show me anything in particular, but instead I made note of what they chose to show me. I later used these observations in combination with the house life stories to see what was important and relevant for the homeowners. The tour further became useful when we sat down afterwards to talk about their homes, as I better understood what they were referring to and could ask more detailed questions.

Reading relevant documents

Finally, I have gathered and read all climate change related documents, strategies and plans for Lolland and Copenhagen municipalities. The aim of this has been the same as when interviewing the people working with climate change issues; to gain insight into how climate change adaptation is understood and turned into practice in the municipalities. In this way, these two methods support each other. I have used reading documents to plan the interviews, but also to obtain a picture of the official strategies and possible differences between these and the perceptions of the people working professionally with climate adaptation.
Data collection

As is the case in most qualitative studies with an explorative approach (Hammersley and Atkinson 2007), my research has not followed a premade plan. Instead the research and data collection have developed during the process. As I explored further into the field of study, new people become relevant to talk to and new connections interesting to follow. I will therefore continue here to explain the development of my data collection in the two cases.

Lolland

On Lolland I talked to two different groups of people. The first is people that through their jobs work with climate change related issues. The second is homeowners living in one-family houses.

I started by doing one preliminary interview with two peoples in Lolland Municipality; a local politician who was head of the climate, technology and environment committee in the municipal government and the head of the technical and environment department in the administration of Lolland municipality. The interview was made in October 2012 and the aim was to gain an initial insight into the field. Therefore, the interview focused on the challenges seen for Lolland relating to climate change and how the municipality was currently addressing these. I used this interview to choose which homeowners I should later interview, and to gain background knowledge for these interviews.

The next part of my fieldwork was a 10-day stay in Nakskov in November 2012. During this time I carried out eleven interviews with homeowners, of which three were with couples. I performed a further five interviews with people who had jobs I found relevant; another employee from Lolland Municipality, the head of the Port of Nakskov, the head of Lolland Utility Company, a local real estate agent and a local architect.

I made the final part of my data collection in this case study in January 2013. Here I used 2 days to carry out interviews in the village Onsevig on the north coast of Lolland. I made four interviews with homeowners in Onsevig and an interview with one more local politician living in Nakskov.
How I chose whom to interview

As I had different aims for my homeowner interviews than the interviews with people working professionally with climate adaptation issues, I used different ways of selecting the two groups of interviewees.

With the homeowners interviews my aim was to gain insight into how homeowners in Nakskov and Onsevig perceive their own risk from climate change and what they have done to adapt to this. To obtain as many different perspectives as possible represented in my data, I sought to include people with a broad variety of life situations, and people living in different areas of the town and village. I therefore used a number of channels to find people who were willing to let me into their homes and talk to me. In Nakskov I came into contact with four through various contacts in my personal network. Three I came into contact with through other homeowners whom I had already interviewed, and three through the local real estate agent and the head of the port of Nakskov. The final one I contacted by finding his number in the telephone book. I had not planned to carry out interviews outside Nakskov, but several of the people I interviewed, both the homeowners as well as the public workers, highly recommended that I talk to people from Onsevig. I decided to follow this advice and perform a small number interviews in Onsevig. Here, I contacted three of the people by finding them in the phone book. The last one, I had been given contact details for by the architect I had interviewed earlier.

In the end, I interviewed four families with children under 10, three of which had teenage children, five that were retired and three there were living alone. They were spread all over Nakskov and Onsevig. In Nakskov I had aimed to talk to people living in places that were marked of as special risk areas in the EU Floods Directive report (see Figure 2). Eight of the households interviewed turned out to be in these special risk areas; three were not.

For the people working with climate adaptation issues, I was interested in interviewing all the different professional groups involved at the time in planning and managing the climate adaptation process in the municipality. I therefore used my first interview with the local politician and the head of the technical and environment department to identify who would be relevant to talk to. Later some of the interviewees also referred me to others they thought would be relevant. By following these different connections between actors, I gained a picture of who actively influenced the adaptation work at that moment. My perception subsequently was that I managed to include perspectives from the most important professional groups in this regard.
Copenhagen

As in the Lolland case, in the Copenhagen case I also ended up focusing on two different groups of people, but here the data collection process was quite different. I started by finding the homeowners I wanted to focus on, and first thereafter extended the fieldwork also to include a number of people working professionally with climate adaptation in Copenhagen. In this case, developing the fieldwork and finding relevant people to interview were therefore more interconnected, and, as such, I have not been able to separate them into two sections as above. Instead I present how my data collection developed alongside my knowledge about the field.

I sought to focus on homeowners who had some special motivation for or interest in climate change adaptation, in accordance with my aim for finding an intensive case (Neergaard 2007). After the cloudburst in 2011 I had no shortage of Copenhageners with personal experience of flooding to choose from. I heard about the housing cooperative A/B Park through a friend who was living there. She told me that the housing cooperative was in the process of planning a large rainwater handling project. I found this interesting and decided to take a talk with the head of the executive committee of A/B Park. This interview was made in September 2012. After the interview I decided that it would be interesting to follow the development of this rainwater project and A/B Park in general. My expectation was that through this I could gain insight into what was important for homeowners, in this case apartment owners in a large city housing cooperative, when taking steps towards adapting their buildings to a changing climate or to extreme weather in general. I therefore asked permission to participate in the meetings of the executive committee. After signing a confidentiality document in which I agreed not to disclose any information concerning named individuals, I could attend both the general meetings as well as the committee meetings. Over a period of 1.5 years I attended six committee meetings and two general meetings. As an observer at these different meetings I had the opportunity to follow when and how climate change issues were brought into the discussions and how this influenced the actions taken.

After observing a couple of meetings I decided that it would be relevant also to make a number of individual interviews with some of the committee members. I used my knowledge from sitting in on the meetings to choose four people that had shown different opinions and points of view in the discussions, including the head of the committee. Those interviews were made in January 2013. At the same time I also interviewed the technical adviser A/B Park used in connection with their rainwater project. At the very end of my fieldwork, in December 2013, I carried out one more
interview with the head of the committee to hear the latest update on the project as well as his understanding of the project and how it had not gone as he had thought when I first talked to him more than a year before.

After following A/B Park for a year it became clear how their rainwater projects as well as their understandings of their own risk and responsibility were heavily influenced by the climate adaptation work on the municipal level. I therefore decided to perform a number of interviews with people working professionally with climate adaptation in Copenhagen. I already had a good idea from seminars and my network about who was involved in this work and relevant to talk to. I subsequently made interviews with five different people working in different sectors of the municipality, two people working at HOFOR (the utility company of the region) and one person working at Rambøll (a company of consulting engineers involved in the adaptation plans of Copenhagen). These interviews were all undertaken in the period from November 2013 to January 2014.

The process of analysis

As description of my data collection shows, there has been no clear boundary between data collection and analysis. Instead, the ongoing analysis of my empirical findings has influenced how the data collection has developed. This means that I have been analysing data continually throughout the whole research process, not only towards the end.

I have, right from the initial stage of data collection, used Clarke’s (2005) situational analysis as a tool to trace connections or find new relevant actors to include. I have especially found her mapping tools useful to systematise and develop my analytical thoughts. For Clarke, mapping is seen as the main tool for detailed exploration of large amounts of empirical data, and especially for “opening up” data (Clarke 2005:83). In the mapping exercises you write down everything connected to the issues in focus, whether you see it as directly relevant for your study or not at the time. You have to include all elements that in some way make a difference. Clarke provides a list of possible elements to consider; humans, policies, organisations, spatial elements, things, technologies, discourses, etc. By going through these possible categories you force yourself to expand your view and to analyse your data in a more explorative way. Clarke gives several examples of different types of mapping where this kind of explorative inclusion of new actors is
more or less systematic and other types of mapping exercises where connections between actors instead are in focus. I have used all these types of mapping exercise continually from framing the focus of the project to the final phase of my analysis. Each time I have found that I have gained new insights or at least managed to organise my thoughts better. Figure 5 present two examples of maps created; the first from the very beginning of the study where both mitigation and adaptation were included. It provides a picture of all the different actors I expected could play a role and which of these I planned to look at in more detail. The second map is from the work with the first article and shows how I sought to gain an overview of the Lolland case.

Figure 5: analytical maps

I transcribed the interviews continually as I completed them during data collection. I did this myself, as I find it is the best way of becoming familiar with the interview data. I transcribed nearly all of the interviews in their full length. A few of the interviews with people working professionally with climate adaptation issues in both Copenhagen and Lolland were only transcribed in part, with a short summary made of the remaining material. This was where most of the issues discussed in the interviews were far from the focus of this study. All interviewees with homeowners have been
anonymized and the names used in the thesis are pseudonyms. In the interviews with people working professionally with climate adaptation, titles instead of names are use. Still here total anonymization has not been possible. Instead I have ask permission in cases where I quote directly.

On completing the transcriptions of the interviews I transferred them to the qualitative analysis software NVivo. I used NVivo first to perform an overall coding of the interviews on the basis of my research questions, coding for issues like; perception of own risk, adaptation measures taken, experience with floods, and discussion about climate policies. As the various focuses of my different articles developed, new codes were made and all relevant interviews were recoded. The majority of interviews have therefore been coded at least twice.

**Including and excluding actors in the analysis**

As mentioned in the introduction I started out with a broad focus including both mitigation and adaptation. I quickly found that I needed to narrow the focus down to be able to explore the research topic in any depth. My initial empirical findings were instrumental in my decision to focus mainly on adaptation as they showed that mitigation and adaptation indeed were very different issues for the homeowners. This was in itself an interesting finding, as an earlier study from 2009 had conversely found that homeowners mixed the two issues up in interview situations, as when asked whether they had taken any adaptation measures, they started talking about their interest in reducing their energy consumption (Petersen et al. 2009). The question is if it is only the four years difference between the studies that has made this difference? In any case, I found it still more difficult to include both issues in this study. I therefore decided to follow the adaptation track, and only involve mitigation to the extent that I found it empirically connected to adaptation. The ongoing analysis of my data helped me to narrow down the focus of my study as I became still clearer that I could find no central connection between mitigation and adaptation issues in the homeowners’ actions or perceptions. Especially here, the mapping exercises helped me by illustrating which actors or elements seemed not to be connected.

The mapping exercises also helped me to see unexpected connections and thereby include elements I had not found relevant to begin with. A central result I obtained from my initial analysis was that it was not possible to keep my data collection limited to one level; that of private homeowners. In the beginning I planned only to interview homeowners. Interviews with other groups e.g. people
working in the municipalities were only envisioned in terms of gaining insight into which homeowners I should talk to and why. However, my first empirical data, especially from Copenhagen, showed me the need to broaden my scope of study. Climate adaptation of private homes turns out to be a more political and contentious issue than I expected. I therefore found it necessary to include other levels where the role, responsibilities and understandings of homeowners also are shaped.

**From surprises in empirical findings to theory**

I started out with theoretical understandings, mainly building on ANT and practice theory, but I aimed to use these initial theoretical understandings more as a research tool to direct my attention towards tracing networks and exploring practices rather than to set up hypotheses for which connections or practices I would find (Clarke 2005:77). Indeed, a number of findings surprised me and challenged some of the pre-conceptions I had in the beginning. Especially three findings became central for how my analysis developed. Firstly, that the majority of the homeowners in the Lolland case were not worried at all about the issue of climate change, despite living in a designated area of risk. Secondly, that even though my aim was to understand decision making in private homes, I often could not get people to recall any decisions made, and thirdly that the SUDS project in A/B Park I had decided to follow never came to be implemented. These three findings later turned into my three articles, but prior to this they made me search for theories which could help me to understand and explain them. Inclusion of the dwelling perspective of Ingold and later urban assemblage theory was a result of this search.

**From theory to a deeper understanding of empirical data**

After including Ingold and urban assemblage theory, I then returned to my empirical data and examined it again from these different theoretical viewpoints. The theories then helped me to become aware of new elements and connections I had not seen before. E.g. by including Ingold, the importance of personal experience, as opposed to climate knowledge coming from scientists, came into my focus. ANT elucidated how the trust homeowners had in technology in many cases reached further than personal experience. Practice theory helped me to be aware of the importance of routinised behaviour, socio-technical systems, and social conventions for refurbishment and
maintenance of private homes. Finally urban assemblage theory provided a tool to explore the controversies that can exist surrounding different adaptation plans and technologies. In this way my analysis became a circle, where empirical findings pointed in the direction of certain theories, which again helped me to further open up and explore my data.

According to the situated analysis approach, many different interpretations of any data always exist. By using different theoretical perspectives my aim was to provide more than one interpretation or analysis of the data. However, the nature of the situated analysis approach is that the research is never finished. As everything is connected, it is never possible to include every relevant actor, as one connection always leads to more, and new interpretation of the data is always possible. In this sense, as Latour (2005:148) argues, the research project ends when you have written e.g. 50.000 words, not when there is no more to find. This perspective can also be said to apply to this research project. I have aimed to make an analysis of the responses of homeowners to climate change in two very different settings as detailed and interesting as possible within the three years of the project. The aim has been to find and describe the elements that have seemed most important for how homeowners perceive and act in relation to climate change. I have followed the connections I found all through my data collection and analysis, and my perception is that I have been able to include the most important ones. Also by including more than one theoretical perspective, I have tried to open up for several different interpretations of the data. Still, many relevant connections and elements may still be out there and relevant to find and explore in further research. I suggest a few in the conclusion chapter.

The question of validity

To finish this methods chapter I will shortly touch upon the concept of validity. Validity in many research settings is connected to the extent to which a study can be generalised and is reliable, meaning that others can repeat the study. Both of these factors seem irrelevant when it comes to case studies. A case study is by definition a study of a situation in a specific context. The aim is not to generalise but to provide detailed knowledge about complex situations (Flyvbjerg 2006, Thomas 2011). Similarly, it would never be possible to reproduce a case study as it is always context dependent, but also because the researcher never can put themselves outside the situation (Hammersley and Atkinson 2007, Gubrium and Holstein 2003). This does not, of course, mean that the results issuing from a case study are random and without scientific value. Instead, it means that
the quality of a case study has to be evaluated in other terms than ability to generalise and reliability (Thomas 2011, Kvale 2008). Quality here instead has to come out of the theoretical and methodological choices and the overall process of analysis. The aim of this chapter has therefore been to illustrate and convince the readers of the quality of this study.
Findings

In this PhD project I have sought to study private homeowners’ responses to climate change, with special focus on climate change adaptation and thereby risk perception and material change in and around people’s homes. I have been interested in how climate change does and can influence how homeowners spend time and money on improving or securing their homes. My findings from the study fall into two main categories. The first relates to how climate change and climate change risk are perceived by the homeowners and how this perception is connected to their actions. The second relates to how we, on a more general level, can understand the actions of homeowners when they repair, maintain or refurbish their homes. By combing these two types of insight this thesis contributed with new knowledge about when and how homeowners take climate change into account when they invest in their properties. Furthermore, this study feeds into the ongoing development of practice theory in a way that also can be useful for environmental sociologists working with other issues than homeowner responses to climate change. Finally, I hope that the findings from this study can contribute to political work aiming to make private homes in the northern countries more resilient to a climate with more extreme weather events.

I will now present and reflect upon the main findings in my three articles by organising them into the two categories mentioned above. I will include findings from both case studies, and also discuss differences and similarities between these two different contexts. As mentioned, I did not choose the cases to be comparable in the sense of displaying just a few central differences that then would become the focus of analysis. The two cases differ too radically. Instead, I use the differences in the cases to discuss the findings as well as ways the context can and does influence the responses of homeowners to climate change.

Understanding how local landscapes and technologies shape perceptions and actions toward climate change

A main interest of this study has been to improve the insight of how homeowners perceive their own risk relating to the effect of climate change, and if this potential concern turns into adaptation action. Here, the two case studies have shown that personal experience with local landscapes is an important factor, but also how different water-managing technologies can mediate this experience as well as be central in debates surrounding risk and potential adaptation solutions. Finally, the
connection between risk perception and personal adaptation action depends on how the responsibility is shared between public and private actors. I look below at these three aspects in turn.

The importance of long-term experiences with local landscapes and weather

The first article explores how a number of people on Lolland perceive their own risk in relation to climate change. I conclude that they do not feel at risk, even though they live in a designated flood risk area. I argue that one of the main reasons behind this is that for many generations people on Lolland have been used to living with drainage and stormwater issues and associated flood risk as omnipresent in their everyday lives. This means that they do not see the past flood events as a forecast of climate change. Instead they see these as a normal part of how it is to live on Lolland. In this way, their long-term everyday experiences with their local landscapes have shaped how they perceive single extreme weather events. As climate change is not visible in the same way, they find it difficult to imagine it will come to have an effect on their own landscape, at least in their lifetime, or as something they have to be concerned about. Their personal experience with living in a landscape where floods are normal also means that they know where floods usually occur and where floods are never a problem. This gives them the sense of security that if they live in areas that to date have never been flooded, this will continue to be the case, eliminating the need to take precautionary measures.

The case study of the housing cooperative in Copenhagen gives another picture. The cloudbursts in 2010 and 2011 were seen as very unusual events as the city had never experienced such heavy rainfall, at least not two years in a row. Climate change was therefore quickly brought into discussion of these extreme weather events. Despite it not being possible to prove the connection between such events and climate change, the cloudbursts were seen as an illustration of the challenges climate change could pose for the city in the future. In response, the residents of A/B Park expressed concern about the effect that climate change will have for them, their buildings and their local neighbourhood. They expected that they would have to do something to adapt to this new climate sometime in the near future.

The two case studies therefore show that it is not only isolated extreme weather events that have an influence on risk perception and interest in taking adaptation measures. Also, long-term experience
with local landscape changes and weather influences how the isolated weather events are understood and acted upon. On Lolland the flood event is treated as less ‘scary’ than the cloudbursts were in Copenhagen. On Lolland measures have been adopted to reduce the damage such an event could cause another time, as when people in Onsevig built a dike around their village. Still, for the majority of homeowners there was no concern that the next flood might be even worse. This means that flood protection had been planned and turned into reality on the background of earlier experience, not on the background of climate change scenarios predicting floods in places never before flooded. In the case of Copenhagen we see another picture. The experiences with very damaging cloudbursts in recent years, and the way in which they were connected to a changing climate, mean that measures are now adopted to adapt the city to this kind of, or even worse, weather events. Also areas that have not experienced problems of flooding to date are still included in adaptation planning. In A/B Park, even though they did not suffer any significant damage in the recent cloudbursts, they still found it relevant to think in terms of adaptation measures when planning for the future.

In light of the above I will argue for the importance of looking at the connection between homeowners and their local landscapes over longer time spans to be able to understand their risk perceptions in relation to climate change, and their interest in taking adaptation measures.

**How technologies mediate perceptions and actions**

However, both cases also show how various types of technologies mediate personal experience of local landscapes as well as influence how and when risk perception is translated into action. As I have mainly concentrated on flood risk, my focus has been on technologies related to managing seawater and rainwater. In this category of water-managing technologies I include pumping stations, dikes, sewerage systems and various kinds of local rainwater handling technologies such as; soakaways, green roofs, rainwater beds, permeable surfaces, and collection and use of rainwater. I will describe how these kinds of technologies have agency in relation to the way the homeowners can and do respond to climate change.

The Lolland case study shows how the dikes and pumps already in place influence both the risk perceptions as well as the adaptation actions of the homeowners. With the perspective of Latour, Lolland can be understood as a hybrid landscape. To avoid floods, large areas of Lolland and nearly
all of Nakskov depend on pumps that must be functional at all times and dikes that have to be well-maintained. Without these water-managing technologies it would not be possible to live in many places on Lolland. However, the pumps and dikes have been in place for so many years that they now are taken for granted; to the extent that they have become something the homeowners do not give any thought to in their everyday lives. When the sea level rises higher or the rain falls more heavily than normal, the management technologies in place take care of the extra water with the result that the homeowners do not notice these weather episodes. In this way, the technologies mediate the homeowners’ experience with their local hybrid landscape. When the homeowners do not personally experience the landscape changes, they are less likely to take adaptive measures, which, according to Ingold, would be the natural human reaction to changes in people’s local landscapes.

Another central issue is that the water-managing technologies support the idea among the homeowners on Lolland that they can and will always be able to control the water, thereby removing the risk of flooding. Many years of experience with living in a landscape dependent on water-managing technologies has informed them that nature can be controlled to an extent where their lives can go on as always. In Latour’s words, they hold on to a belief in ‘the modern constitution’ that tells them that it is possible to keep nature and society separate, both now, but also in a future with climate change. It may be necessary to build larger pumps or higher dikes, but the people on Lolland do believe that this kind of technology will be able to cope with climate change. The case of Lolland shows that the homeowners’ lack of concern about the risk of climate change is not only connected to local landscape experiences but also builds on a clear idea about what kind of measures or technologies can be used to solve potential future problems. This consensus about both the problem and solutions is interesting, especially compared with the Copenhagen case. Here, on the contrary, several controversies were revealed both with regard to identifying the main problems related to climate change that the city needs to adapt to as well as what are seen as the best solutions to each problem.

The third article discusses how climate change is what Leyshon and Geoghegan (2012) call an ‘uncertain imminence’, meaning climate change is still an unpredictable phenomenon, the extent or effects of which we do not know. This means that ‘climate change’ can be understood differently in different social contexts. In this way, adaptation actions will always be a response to something that we still do not know the precise nature of. In Copenhagen this has created a number of
controversies around climate change adaptation. I argue how it is possible to identify a number of assemblages of actors that place different future climate problems at the centre of their concern, thereby giving central water-managing technologies different agencies. Depending on how these technologies are connected to other actors, both humans as well as non-humans, they are given different roles in the climate change adaptation of the city. The main focus of the article is on the SUDS project in A/B Park. For the residents of A/B Park their project is seen as a solution to several climate change problems; more daily rainfall but also longer dryer periods that can lead to water shortages. Conversely, the planners in the municipality and the local utility company connect the SUDS technology to extreme weather events such as cloudbursts, where they do not see SUDS as being able to make a difference. For them water shortages are not a part of the assemblage they see for climate change. This means that for the first group, the people in A/B Park, SUDS is seen as a good solution in response to climate change, whereas for the second group of professionals involved in climate planning SUDS is seen as a solution targeting the ‘wrong’ problems. This shows how the same water-managing technologies can be perceived differently depending on how they are connected to a wide variety of other actors.

At the point at which the long-term experience with flooding on Lolland creates some kind of consensus on what makes good solutions, the newness of the situation in Copenhagen conversely opens up for contention about the way in which to approach adaptation work. With the assemblages perspective we seek to argue how the different ways of connecting the actors create several ‘climate adaptation realities’ existing side by side. We argue how this can have a positive effect, as it means that a broader range of potential climate problems are represented, which in the end might create a more resilient city. On Lolland, however, the assemblage, consisting of the landscape, dikes, pumps and earlier experience with floods, can seem to be in some way ‘frozen’, in the sense that it has such wide support that it is not challenged. This could be useful when the adaption planning here begins to turn into concrete projects sometime in the future, as a number of conflicts may be avoided. Still, it could also mean that it becomes more difficult for new perspectives, solutions or technologies to be enrolled and considered as relevant. On the other hand, the concrete project of A/B Park shows that the controversies that exist in the Copenhagen case also could have a limiting effect, as the SUDS project never came to be implemented, largely because of these. This points to the relevance of trying to identify the controversies that exist, or also of interest, that do not exist, surrounding the different surface water management technologies relevant for private homes. This
can help us to understand why certain perceptions of future climate risk might not turn into adaptation action, or indeed do, but in surprising ways.

The above-mentioned findings show in different ways the importance of identifying and including the different water-managing technologies and their agencies when we seek to understand both how homeowners perceive their own risk, and what kind of personal and collective adaptation measures they find relevant to adopt.

**How controversies exist in the allocation of responsibility**

The final issue I will go into in this section relates to how perceptions of the way responsibility is shared between private and public actors in relation to climate issues also influences the way homeowners take measures to adapt to climate change. The Scandinavian countries are well known for placing considerable trust in public systems. However, in Denmark is it legally defined that securing properties against the sea is a private responsibility, and in most cases the same applies in the case of drainage on private land. This legal situation was strongly emphasised by those working with climate issues in Lolland municipality. In fact, on Lolland all the pumping station and dike cooperatives are owned by the homeowners affected. The majority of the homeowners interviewed in the case study therefore pay to a pumping or a dike cooperative. Still, at the same time, they do not see maintenance or possible enlargement or extension of these technologies as their own responsibility. As mentioned, the technologies have become such a natural part of their local landscape that they have ceased thinking about their existence. When talking about climate change, their perspective is that potential challenges could be solved by larger pumps or higher dikes, but they see it as the responsibility of the municipality or the state to take the lead in this process. In the case of Onsevig another picture is shown. Here, it was the homeowners themselves who took the lead in starting up the dike project. However, it was considered essential right from the start to find a way whereby the majority of the expenses could be paid by public funds. In this way, also the project in Onsevig supports that the general perception among the homeowners on Lolland is that they should not be expected to protect their properties against floods without some kind of public support. This shows that on Lolland a number of disagreements or controversies exist between responsibility as defined by the law and as experienced by the homeowners. For the people on Lolland this perception of public responsibility translates into a reduced feeling of the need to take individual adaptation action.
Also in the Copenhagen case some important controversies exist surrounding public and private responsibility. However, here the contention centres more on the type of adaptation than about who should pay for it. Public funds are seen as essential for A/B Park to turn their rainwater project into reality. The residents see the SUDS project as being able not only to reduce their own flood risk and water consumption but also to address broader environmental concerns in the municipality and society as a whole. From the perspective of the residents of A/B Park their SUDS project would reduce pressure on the public sewerage system. Moreover, by collecting rainwater to use in washing machines and toilets they would contribute less to depletion of freshwater resources on Zealand. They therefore find it reasonable that A/B Park should not pay the full cost of the project. On the other hand, actors from the municipality and the local utility company have another perspective on what the most important problem of climate change is and therefore see no reason to using public money on a SUDS project of this kind. However, the argument of the public actors here for not funding the project is not, as expressed by the public workers on Lolland, that it is the homeowners’ own responsibility to secure their own property against flooding. The reason is rather that from their perspective the money would be better spent if used to make larger and more collective rainwater solutions.

A difference between Copenhagen and Lolland municipality has been highlighted in the case studies. Where the perspectives of the public employees in Copenhagen align with the homeowners’ in that the responsibility is seen mainly to lie with the municipality, on Lolland the public employees emphasise that it is the homeowner’s themselves that have to pay for securing their homes. They express that the role of the municipality might be to make sure that the homeowners are familiar with their own responsibilities and to facilitate the process of organising themselves into groups to implement new dike or pumping station projects. This is not something the municipality has yet carried out, but the interviews with the homeowners on Lolland show this kind of work to be necessary. None of the homeowners interviewed expressed any knowledge of being responsible in this way, neither had any of them seen it necessary to look into the issue of responsibility. This again reveals that while the law may state another thing, private individuals may take public responsibility for granted.

The Copenhagen case on the other hand shows that homeowners can and sometimes do take an initiative in climate-related adaptation work. Even though A/B Park expected the public sector to pay the largest share of the cost of the proposed SUDS project, they were still willing to contribute
a large sum of money to the project, not to mention time and energy. The project never came to be implemented, mainly due to disagreement about what presented the best way to adapt to climate change. The best ways to respond to climate change are a source of continual debate. However, the third article in this research project discusses whether the involvement of citizens and homeowners ought to be seen to be of value in itself when looking for the best solutions. The perception on Lolland that the water-managing technologies are public responsibility and therefore of little concern to homeowners could be echoed in the future in Copenhagen if the public authorities here take it upon themselves to adapt the city to climate change without involving the residents to any significant degree. Copenhagen homeowners’ feeling of responsibility for their own properties might reduce in relation to the how the situation is now. Furthermore, other studies argue how lay knowledge can provide a useful contribution to expert knowledge, as lay people often have a closer connection to, and thereby deeper understanding, of changes, problems and solutions in their local landscapes (Karvonen 2011, Agger 2010, Ingold 2000). For example, homeowners in Onsevig show very detailed knowledge about normal high water lines and areas prone to flooding that could be useful in future risk mapping and adaptation planning. This type of detailed lay knowledge could be lost to adaptation planning in Copenhagen if citizens are not involved in the decisions but just assigned the role of implementing measures already decided upon. If homeowners instead also become a part of defining the issues and solutions, new insight might be gained. Finally, the A/B Park case study shows that by excluding the homeowners from the decision process, also concrete resources might be lost; time as well as money. On the other hand, if Copenhagen City Council finds ways to involve homeowners, it might be possible instead to generate a situation where climate adaptation is seen as a shared responsibility and one which benefits from the involvement a broader range of adaptation measures and knowledge. On Lolland, the homeowners have been dependent on pumps and dikes for so many years that it might be difficult to change the way these are taken for granted, but in other areas of Denmark these kinds of technologies are very new, allowing for thinking and practising another kind of shared responsibility than exists at present. I therefore argue that it might be worthwhile considering the involvement of homeowners in adaptation planning not as an added bonus, but as an essential factor when searching for best solutions.

I will now take one step back from risk perceptions and concrete adaptation measures, and instead look at what drives the actions of homeowners in relation to their properties on a more general level.
Exploring dwelling as a practice

If private homes that already exist have to be better adapted to climate change, homeowners need to make concrete changes to their houses. It is therefore relevant to look into what drives homeowners when they invest time and money in their properties. What is at play when they repair, maintain or refurbish their homes? The resulting question is therefore to what extent are climate change issues taken into account in this ongoing process of keeping a house in repair.

The need for including both meanings, materials and competences

In this study I use practice theory to look at what drives actions of homeowners. By combining Ingold’s understanding of ‘dwelling’ with Shove’s theory about what creates stability and change in practices, I argue that it is possible to identify a ‘practice of dwelling’ among homeowners. With this, I seek to show how many of the factors seen to keep other types of practice, such a cooking or driving practices, from changing are also relevant in understanding maintenance and refurbishment actions. As Shove sees practices as consisting of meanings, materials and competences, she argues that for a practice to change it is not enough that just part of one of the elements changes; as when new knowledge about a possible flood risk is gained. For the whole practice to change this new knowledge about risk also needs to change the other elements or find new materialites or new competences it can connect to. To give a concrete example; if a homeowner finds out that they live in a flood risk area and that this might have an influence on their property, this new ‘meaning’ does not necessarily translate into adaptation action. For this to happen, the homeowner needs also to have or acquire the required competences. This could be knowledge about where to find information or personal skills to build or create the solutions needed. Furthermore, some materialities in or around the home may prevent action to take place. The house could have a basement in which solutions may be difficult to install or be placed somewhere where the act of one homeowner only transfers the problem to the neighbours. By looking at dwelling as a practice we therefore point to the need to include both meanings, materiality and competences, and how they are connected, when trying to understand how it is possible to influence the actions of the homeowners.
Changes in practice demand time and energy

Even more important is that this kind of transformation of practice demands time and energy on the part of homeowners, both of which are limited in the busy everyday lives of most people. A central part of the definition of a ‘practice’ is that it is an action we have performed so many times before that we do not have to reflect on it in to any great extent every time we do it. We need many of our actions to be practices, because if we had to reflect upon every little thing we did, managing our everyday lives would be close to impossible. The same requirement for routine lies behind ‘the practice of dwelling’. In many cases, maintenance or refurbishment actions build on what the homeowner or someone they know usually does in this or that situation. To bring completely new issues into the practice takes time in relation to finding them, acquiring the required competences, and making the required material changes. In many cases, homeowners just keep on doing what they always have done, not because they have especially decided to do this, but because they have not found sufficient time, energy or interest to change the practice.

Challenging the focus on decision making

With the ‘practice of dwelling’ concept, we further challenge the perspective dominating within policies aiming at homeowners. Here the focus in most cases is on influencing the decisions making of homeowners, as decisions are seen as the driving force behind homeowners’ actions. By arguing for the existence of a practice of dwelling, we propose that policymakers have the potential to influence both more homeowners and more of the time and money the homeowners spend on their houses, by not only focusing on decisions but on the whole practice of keeping a house in repair. We do not seek to challenge that some larger renovation actions are, of course, based on a process of decision making. Instead we argue that a large part of what homeowners do to their homes does not fall into this category and, as such, cannot be influenced by classical political tools such as information campaigns and subsides. The aim of most information campaigns and financial support programs is to make one solution seem better than the others when weighed up against each other in a decision situation. Here, to have an effect, there needs to be a decision the policymakers can influence. We argue that in many cases these kind of political measures do not have an effect, as they are not even noticed. Homeowners, instead, would act on the background of their already existing knowledge and know-how, and not have the time or energy to go out looking for new options or cheaper alternatives. Furthermore, socio-technical systems and social conventions about
normal dwelling practice have the potential to explain why solutions that from a political viewpoint seem the only right thing to do may not influence the practice of dwelling among homeowners to any significant degree. Introduction of a practice perspective to discussion of the maintenance and refurbishment of private homes, therefore, helps to evaluate the effect of existing policies and understand why these sometimes have less effect than expected by the policymakers.

How practices can be changed

Still, existing practices of dwelling do change. Both my case studies show how extreme weather can play a role in this. Personal experiences with extreme weather can make new concerns become a part of keeping your property habitable, as when the homeowners in Onsevig became involved in building a dike around their village, or when the residents of the housing cooperative in Copenhagen developed an interest in handling rainwater locally. When extreme events erupt into people’s every lives, they disturb the ongoing practices of the homeowners sufficiently to create a ‘readiness’ for those practices to change. Both case studies show that these disruptions to everyday life create an opening in which information campaigns and subsidies can have an effect. When the meaning or directly the materiality of the ongoing practice is challenged or changed, homeowners might begin searching for new knowledge or input. In this process, information campaigns might be able to reach them or subsidies influence the actions they decide to take. When the practice is disturbed it therefore opens up for decision making, and these kinds of policies can therefore have an effect. This can be seen as rather problematic from a political point of view, as it means that in most cases it is only when people have experienced damage that they reflect on how they can avoid these happening again. Especially as climate change is expected to result in flooding of areas that never have been flooded before, this might result in many flooded homes before houses in these areas become adapted to changing climate. However, the practice of dwelling perspective also opens up for other adaptation as well as mitigation measures can be introduced into the practice of dwelling.

First of all, ‘breaks’ in practice can also be politically motivated, even though this can require the use of prohibitions or injunctions in addition to voluntary measures. An example is the upcoming ban on oil-fired boilers in both Denmark and Norway, which is forcing homeowners to consider new heating options, allowing for the opportunity to influence homeowners’ decisions in a more sustainable direction. In the same way as extreme weather events, this kind of binding political
measure creates a readiness for change in practices. In both cases, some of the meanings, competences or materialities are challenged, and transformation of the whole practice is made possible. However, one of the central arguments connected to the practice of dwelling perspective is that transformation of private homes does not only come in the form of larger refurbishment projects. In Ingold’s dwelling concept ongoing transformation is central. Homeowners continually make smaller or larger repairs to or carry out maintenance on their properties. Often, the importance of maintenance and repair is overlooked (Graham and Thrift 2007), and we argue that this is also the case in most climate policies. Therefore, in all the continual changes, we highlight a potential for step-by-step making properties more resilient or more energy efficient; by ‘sneaking’ relevant solutions into the ongoing practice of dwelling. An example of this is how energy-efficient windows have become almost the only type of window you can buy in Norway, permitting the energy efficiency of a home to be improved every time a window is replaced. Technologies for flood protection for basements, doors and walls, or storm protection for roofs could also be introduced into the ongoing practice of dwelling in a similar way. I therefore argue that great potential lies in adapting existing private homes better to climate change if the political focus is expanded to the practice of dwelling in its entirety.
Conclusions and perspectives

In the chapter above I examined how climate change and climate change risk are perceived by homeowners and how this perception is connected to their actions. Furthermore, I also looked at how on a more general level we can understand the actions of homeowners when they repair, maintain or refurbish their homes. In summary, I have found that personal experience with both single weather events and long-term dwelling in a landscape are important; this mediated by different types of technology. With the concept of the ‘practice of dwelling’ I argue how perception of risk or knowledge of new technical solutions do not necessarily translate into concrete adaptation actions. This means that for understanding the responses of homeowners to climate change, we both have to look at when and how they see themselves to be at risk from the effects of climate change, and how this perception can be integrated into their ongoing practice of dwelling. On the basis of these findings I now return to my research questions, and in relation to these conclude by arguing how this study has contributed with new insights and by identifying perspectives for further research.

How do homeowners perceive their own lives, their households and their local area in relation to the effects of climate change?

Earlier studies have argued that despite that most people in the northern part of the world believe climate change to be taking place, at the same time they do not believe that it will come to affect them personally (Hinchliffe 1996, Hulme et al. 2009, Petersen et al. 2009, Norgaard 2011). Also in my study I found that nobody denied that climate change was happening, but the two case studies showed that different opinions existed on whether climate change would come to affect the homeowners during their own lifetime. Whitmarsh (2008) argues that experiences with floods in most cases are not connected to climate change and therefore do not make people concerned about the effects of climate change. This conclusion is supported by the findings from my case study on Lolland, but the case study from Copenhagen gives another picture. For the people on Lolland flooding is nothing new and therefore they do not connect it to climate change. In Copenhagen, however, the recent years’ cloudbursts have been framed as very unusual events, and therefore connected to climate change. This makes people in Copenhagen feel more at risk and perceive climate change as a factor that warrants concern here and now. In this light, the conclusions of this study contribute to the findings of Whitmarsh by arguing that single flood events might be
connected to climate change and thereby raise concern about climate change if they hit areas with no prior flood experience. People in areas especially vulnerable to climate change, such as Lolland, and who are used to living in a landscape where extreme weather events such as flooding are a part of everyday life, are not necessarily more concerned about the effects of climate change, and may even be less so than elsewhere. However, this finding has to be seen in connection to the type of risk in focus. In Denmark flooding has proven to cause considerable damage to, for examples, private properties, but generally is not seen as life threatening. Other climate risks, such as forest fires in Sweden or landslides in Norway, seen as a threat to human life might therefore be understood differently by people in areas of risk. The way different types of risk shape concern about climate change could be a relevant issue for further research.

J. Wolf (2010) argues how social networks can support a risk perception that is different from the one found by scientific calculations. In this present study a high degree of consensus has been identified in relation to the extent homeowners felt at risk, both among the homeowners on Lolland and among the residents of A/B Park, respectively. This supports that risk perceptions to a large extent can be socially created and shared. This can again be connected to experiences with local landscapes, not only individual but also collective experiences. The Lolland case study shows how stories about earlier floods are discussed and shared, and often the homeowners refer to flood events they have not experienced themselves, events before their own lifetime, when they argue that flooding is normal on Lolland. These shared experiences are used to support a collective perception of not being at risk from the effects of climate change. Public media, the internet and other platforms for information sharing might also be able to create shared perceptions of risk, but this is not an issue to which I have given specific attention in this study. This could also therefore be another interesting field for further research.

Several earlier studies argue that denial might also explain lack of concern about climate change, also shared in larger social groups (Norgaard 2011, Grothmann and Reusswig 2006). These findings are not supported by my studies. I argue that the homeowners interviewed on Lolland not being worried about climate change is not a matter of denial. Rather, it is a result of their experience with their local landscape, their trust in surface water management technologies and a fundamental belief in that humans now and in the future will be able to control the possible effects of climate change to an extent that it will not be something they will feel in their everyday life. Furthermore, my study
points to existing water-managing technologies ‘hiding’ weather and landscape change, as they take care of rising sea level or unusually heavy downpours without the homeowners noticing.

This thesis thereby contributes to earlier knowledge about perceptions of climate change by showing how people, and whole societies, build their risk perceptions on the background of their own and collective experiences in the landscape in which they live. Furthermore, the study provides insight into how different water-managing technologies not only can be used to adapt to climate change, but can play a central role in shaping perceptions of future climate risk.

**What makes homeowners adapt their private homes to climate change?**

This study supports earlier studies that show that experiences with floods and the associated perception of personal risk are mirrored in adaptation actions (Kreibich et al. 2010, Wind et al. 1999, Koerth et al. 2013), as when the people in Onsevig build a dike, or when A/B Park seeks to implement a SUDS project. However, where the study especially contributes with new knowledge is by exploring and understanding why homeowners do not take any adaptive action, even when they live in areas that have been designated as flood risk areas and where flooding has been experienced. Earlier studies indicate that financial aspects and feelings of not being able to make a real difference explain why people do not adopt adaptive measures even when they feel some kind of risk (Grothmann and Patt 2005, Grothmann and Reusswig 2006, Thieken et al. 2007). This is challenged by this study of homeowners in Denmark. The Copenhagen case study shows that money can play a role, but my argument is that it is not the main reason for lack of action. Instead trust in technologies and public systems play a larger role.

Adger et al. (2009) and O’Brian et al. (2010) argue that other factors than financial aspects and limitations in possible technical solutions have to be taken into account when trying to understand when adaptation measures are taken. The empirical finding of this present study clearly supports this perspective. Adger et al. further argue that something that can be the main challenge for adaptation actions in one context might be different in another. On Lolland, the main reasons for the lack of adaptation action are first of all that they do not feel at risk and secondly that they expect that it will be possible to solve future climate problems by technical means. Other studies have indicated that a reason for not taking any adaptive measures is lack of knowledge about and trust in possible technological solutions (Adger et al. 2009, Thieken et al. 2007). The opposite seems to be
the case on Lolland. Here, it is more the homeowners’ strong trust in existing technologies that keeps them from taking any further measures. Conversely, in Copenhagen, the main reason is controversies about what to do and who should do it. It is not, as earlier studies have argued, that the homeowners do not believe they are able to do anything to reduce their own risk (Grothmann and Reusswig 2006, Thieken et al. 2007), or that they lack knowledge about or trust in possible technological solutions. It is more the controversies that exist surrounding what constitutes the best solutions.

Related to technological issues, both the trust in them and the controversies surrounding them, is the way that homeowners in Denmark have a fundamental belief in that if a risk becomes large, the public system will step in and take action. This is often seen as especially characteristic for Scandinavian countries. However, the reality is that in Denmark securing private property against flooding is a private responsibility, defined by law. This goes against the perspective expressed by people both on Lolland and in Copenhagen, who expect the public system to take the lead in protecting them against flooding. The way responsibility for adaptation is divided between public and private actors, and the potential controversies that could and do arise in this connection, is something that might need more research to be understood fully. At the moment, many dike projects are being implemented all along the Danish coast. In accordance with the law, they are all privately financed, but in most cases the municipalities are involved in the projects as facilitators. It could be interesting to study some of these projects and how public and private responsibility is debated, created and given meaning in the process. Furthermore, it could be relevant to look into this responsibility issue across all Nordic countries, with the aim of finding reasons for similarities or differences.

When arguing how landscapes, technologies and experiences of responsibility influence adaptation action taken, adaptation measures are looked at as isolated actions which can be influenced by different factors. However, another central contribution of this study is to argue that adaptation actions cannot be understood by looking at them in isolation. Instead they have to be understood as a part of the ongoing practice of dwelling. This understanding is supported in the special issue of Building Research and Information, ‘Energy retrofits of owner-occupied homes’(Gram Hanssen 2014), although my approach differs slightly. Building on Ingold’s dwelling perspective and on practice theory, it is argued that not only a practice of energy renovation or taking adaptation measures exist, but a ‘practice of dwelling’ that is relatively stable. This dwelling practice builds on
embedded and socially transferred knowledge about what to do in different situations, with the result that new issues are often difficult to introduce into the practice. This means that the issue of climate change and the potential need for adaptation measures might not influence the existing practice of dwelling. Not only due to the factors mentioned above, but because the issue is simply not given any attention or thought to by the homeowners. They just keep taking care of their homes as they always have done.

**Do climate change and climate change policies affect the transitions that are taking place in private homes?**

In the light of climate change as this rather abstract concept which has been measured by scientists but which not is possible to directly observe by lay people, this study shows that knowledge about climate change does not have any direct effect on the actions of the homeowners in the study. This supports earlier studies (Hinchliffe 1996, Lorenzoni et al. 2007, Norgaard 2011). No one has been identified to be taking adaptive measures due to their knowledge of climate change. Adaptive measures are first taken when extreme weather events are connected to climate change. In this way, the present study fully supports other research and theories that argue that what people experience is the weather and not the climate (Brace and Geoghegan 2011, Ingold and Kurttila 2000).

When looking at how climate change policies can and do affect the actions of the homeowners this study contributes with two central findings. The first is that information campaigns and economic subsides sometimes can have an effect on the decisions made by the homeowners. When the family on Lolland decided to get PV solar panels on their roof and when A/B Park decided not to go ahead with their SUDS project, in both cases they searched for information and options for funding, and these options influenced their final decisions. However, where this study especially contributes with new insight is by arguing that for this kind of political instrument to have an effect a decision has to take place and some kind of ‘readiness’ for change has to exist in the practice of dwelling. This means that in reality, policy initiatives only influence a small part of homeowners; those who for some reason have been pushed towards giving attention to the issue of climate change. This kind of ‘push’ can come from personal experience of climate change or new laws. In such situations people might begin looking for information. The remaining homeowners might never notice the political initiatives and these therefore will have no effect.
However, this study also points to ways in which these remaining homeowners might also be influenced to make their homes more resilient to extreme weather or more energy efficient. Williams et al. (2012) argue how political adaptation projects have a greater chance of success if they are integrated into existing regeneration schemes, ongoing maintenance, greening initiatives, and so on. This is fully supported by the findings of this study, where I argue that there is potential in introducing adaptation technologies and solutions step-by-step through the ongoing process of maintenance and repair that forms a continual part of the practice of keeping a house habitable. In this sense, I argue that policies do and can influence transitions in private homes, but that much more could be done to steer transformation of private homes towards a more sustainable and resilient future. By moving the focus from just economic motivation or risk assessment mapping to taking the whole practice of dwelling into consideration, more homeowners and properties might be reached.

A final point has to be made about the potential of policies to influence homeowners’ actions. Thieken et al. (2007) argue that more information about possible protective measures and their efficiency would be able to make risk perception translate into action. However, this study clearly shows that often many different opinions exist about what constitutes ‘the best solutions’, and that these controversies surrounding the potential of different adaptation solutions can mean that no action is taken by homeowners. Therefore, again here, it is not only lack of information that prevents homeowners from reacting, but more lack of consensus with public planners and scientific models that prevents them from translating concern about climate change into action. This finding indicates that it is not only information about specific and possible solutions that is needed, but also for policymakers and planners to go into dialogue with homeowners with the aim of creating a shared understanding of the main problems and potential solutions. I further seek to propose that including homeowners in this way might not only reduce controversies but contribute to the creation of more resilient cities in which a broader range of possible future climate challenges might be considered and responded to.

In general, climate change adaptation is a rather new issue for both policymakers and homeowners. Therefore, significant changes in policies, perceptions and actions have taken place even during the relatively short three-year time span of this study. Several new policies have been introduced aimed at homeowners; including launch of a climate adaptation information homepage (www.klimatilpasning.dk) and the option for homeowners to get a professional ‘climate check’ of
their home for free. These initiatives are so recent that I have not yet been able to look at their possible effect in this study. However, on the basis of the findings from this study it would be possible to question whether these kinds of political initiatives have the expected effect. The effect of these new adaptation policies could therefore be an interesting field for further research, especially combined with the influence of a general growing concern about climate change. My perception is that if this study was to be repeated in three years, the findings would be different, both in Copenhagen and on Lolland.
PART II: The articles
Article 1:

Climate change or variable weather
Rethinking Danish homeowners' perceptions of floods and climate

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Published in Regional Environmental Change
DOI 10.1007/s10113-014-0701-1
http://link.springer.com/article/10.1007/s10113-014-0701-1

Abstract
Climate scenarios predict that an effect of climate change will be more areas at risk of extensive flooding. This article builds on a qualitative case study of homeowners in the flood-prone area of Lolland in Denmark and uses the theories of Tim Ingold and Bruno Latour to rethink the way we understand homeowners’ perception of climate change and local flood risk. Ingold argues that those perceptions are shaped by people’s experiences with and connections to their local landscape. People experience the local variability of the weather, and not global climate change as presented in statistical data and models. This influences the way they understand the future risks of climate change. Concurrently, with the theory of Latour, we can understand how those experiences with the local landscape are mediated by the existing water-managing technologies such as pumps and dikes. These technologies prevent the residents in Lolland from experiencing many of the changes that are already occurring and, at the same time, give them a feeling of being able to control the water to the extent that it is prevented from flooding their homes, both now and in the future. The combination of these two theoretical approaches gives new insights as to why people living in flood-prone areas are not very concerned about climate change.

Key-words
Climate change adaptation, flood-risk, homeowners, Tim Ingold, landscape, actor-network theory.
Introduction

As some measure of global climate change seems inevitable, and global warming is beginning to manifest itself in the form of melting ice caps and extreme weather events, authorities and citizens around the world face a situation where they soon will need to adapt to the effects of climate change. People in many areas are becoming more exposed to floods, storms, heavy rain, extreme heat, fires and the ensuing damages to their homes. A pertinent question would therefore address the way they respond to events and changes in their surroundings as well as to the prospect of climate change and its local effects. This article focuses on Denmark, a country where climate change is still more of a political issue than a matter of life and death or the loss of livelihood, the way it already is in many less privileged parts of the world. Nevertheless, climate change adaptation is becoming an important priority in Denmark.

Building on prognoses from the IPCC and the Danish meteorological institute, Danish politicians and planners expect that anthropogenic climate change in Denmark will lead to a warmer and wetter climate and an increase in extreme weather events (Olesen et al. 2012:37, IPCC 2014). The prognosis is that there will be more rain in the winter, and summers will have longer periods of drought combined with heavy downpours. Storms may also become stronger and potentially more damaging. This, together with the expected rise in sea levels, leads to the prediction that Denmark will experience more frequent, larger, and more damaging floods in the future (Olesen et al. 2012). When the Danish government and the municipalities therefore talk about climate change adaptation, the focus is on reducing or removing the risk of flooding (Lolland Municipality 2012, Naturstyrelsen 2012).

Several incidents over the last few years have shown the extent to which private homes in Denmark are exposed to floods and the dangers they entail. A storm surge that hit most of Denmark on the 1st of November 2006 serves as an illustration of the sizable losses that extreme weather can cause. After this particular incident, 1,313 private households reported damages totalling €50 million in insurance claims (Stormrådet 2009:37). These costs do not just reflect the material and economic losses that residents suffer when they are struck by extreme weather, but they also reflect the disruption, the loss of personal valuables and even the loss of entire houses that such incidents may cause in people’s lives. This also re-actualizes the question of how people are integrated in, and respond to, the landscapes in which they live and how this relationship with the landscape is
challenged by abrupt and drastic events and the lasting changes to the landscape that follow from a changing climate.

This article is based on a qualitative case study of Lolland, a coastal municipality and one of the lowest areas in Denmark, where the largest town, Nakskov, has been designated a high-risk flood area in the risk assessment report produced in accordance with the EU Flood Directive (Miljøministeriet et al. 2011). Throughout history, Lolland has experienced extensive flooding, with the latest incident occurring in 2006. This article explores, with the help of the theories of Tim Ingold and Bruno Latour, how homeowners living in flood-prone areas perceive their own lives, their households and their local areas in relation to the effects of climate change. Do they feel that climate change is something they should be concerned about? Does this concern translate into action? And are their previous experiences with flooding a critical factor in their adaptation to their current surroundings and the prospect of more extreme weather in the future?

In the following, we will first give a short overview of research in the field of climate adaptation and flood risk. Following this, the case study and the study method will be presented, after which the theoretical framework for understanding the relations between people and their socio-technical landscapes will be outlined, whereupon results from the Lolland case study will be elaborated.

**Background: Connections between flood, climate change and adaptation measures**

When the Danish government introduced its recent Climate Adaptation Strategy in 2012, flood risk was presented as the biggest concern (Naturstyrelsen 2012). Given that Lolland has been designated a flood risk area in the EU Flood Directive report, it makes climate change adaptation a synonym for flood protection in the perspective of the politicians and planners from Lolland municipality. In this article, we want to shift the perspective from that of scientists and planners to that of homeowners living in Lolland. Our aim is to understand how they see the connections between global climate change, local flood risk and the need to take personal adaptation measures. First, we will start with a few thoughts about the concept of risk.

Over the last few years, the concept of risk has shifted from being understood mainly in mathematical terms as the probability of an incident occurring to being seen as subjective understandings that often build on embodied cultural values and beliefs (Jasanoff 1999). Several
theories and studies argue that the experience of certain risks can vary from culture to culture and from person to person (Jasanoff 1999, Douglas 1992, Beck 1992). That scientists have defined Lolland as a flood risk area based on modelled climate scenarios is, in this perspective, not necessarily connected to the feeling of risk experienced by the residents of Lolland. Our aim is therefore to improve the understanding of how residents living in a designated risk area perceive this risk themselves. Flood preparedness research and studies of individuals’ understandings of climate change have explored partly similar issues.

Several studies have shown that most people in northern Europe do not expect climate change to have any impact on them, and this belief determines their engagement with the issue (Hinchliffe 1996, Lorenzoni et al. 2007, Hulme et al. 2009). Phil Macnaghten (2003) argues that the reason for this is that climate issues most often get framed as global problems. This makes it difficult for people to relate to them. But when they acquire insight into how climate change or other environmental problems can affect their local area and everyday life, it can create concern and reactions.

However, Lorraine Whitmarsh (2008) has explored whether people who have experienced floods are more concerned about climate change than other people. She concludes that they are not more concerned in any significant way because they do not associate their flood experiences with climate change. Instead, “[f]lood victims tended to identify a number of local observable causes for flooding, such as road widening and resurfacing, lack of maintenance of watercourses, removal of hedges, local development, pumping station repairs, and so on” (Whitmarsh 2008: 368). Whitmarsh therefore concludes that experiencing a flood does not make people more interested in mitigating climate change.

Nevertheless, experiencing floods does lead to a form of adaptation related to flood risk. A number of studies have investigated how flood experiences influence homeowners’ understandings of the extent to which they are at risk and their ensuing actions. Kreibich et al. (2005) conclude that before the flood on the Elbe River in Germany in 2002, 59 % of the households affected by the flood did not know that they were living in a flood-prone area. In 2006, most of the households knew that they were located in a flood-prone area, including those who had not been affected by the 2002 flood (Kreibich et al. 2010). Kreibich et al. (2010) conclude that flood experience was the main factor influencing homeowners to take precautionary measures to avoid flood damages.
However, Grothmann and Reusswig (2006) argue that there is not always a direct connection between knowing that one lives in a flood risk area and taking measures to adapt to the risk. They argue that factors such as the experience of one’s own capacity to make a difference, denial and fatalism also influence the willingness and capacity to translate knowing about risk into actions. If people experience that the power of nature is too strong for them to influence, it may be a reason to do nothing and just hope for the best. Other studies also point to denial as an important factor for not reacting to the threat of different types of extreme weather connected to climate change (Norgaard 2011; Brace and Geoghegan 2011).

A conclusion that all the above-mentioned studies have in common is that laypeople do not make the same connections between global climate change and local adaptation as climate scientists seem to do. They are not concerned about climate change. They do not experience floods as being a result of global warming and their main reason for taking precautionary measures with regard to floods is based on past experiences, not fear of what the future will bring. The case study on which this article is based confirms those results, but there is need for a more detailed understanding of this, one can be derived by investigating how people of Lolland relate to their local landscape in their daily lives.

Catherine Brace and Hilary Geoghegan (2011: 295) make an argument for including the “embodied, practised and lived – landscapes of everyday life” in research about people’s understandings of climate change. Macnaghten (2003) argues that knowledge about local effects can influence concern about climate change. Following this argument people in Lolland could be expected to be more concerned about climate change. To understand why this is not the case, we will follow the suggestion of Brace and Geoghegan and instead focus on people’s lived experiences with their landscape. With this, we hope to contribute new understandings about the perceptions of climate change of people living in scientifically designated risk areas.

To pursue this aim, we find it relevant to draw on theories that include materiality, especially technologies and landscapes, in understanding people’s perceptions and actions. Bruno Latour’s (2005) Actor-network Theory (ANT) offers a perspective that enables us to understand the landscape of Lolland as a hybrid that is neither pure nature nor pure society. Tim Ingold’s (2007) concept of weather-worlds asserts that people are always embedded in landscapes. Together these approaches constitute a productive frame for making sense of how people understand the connection between climate change, flood risk and their everyday lives. Before discussing the
theories of Latour and Ingold in more depth, we will describe the case study and the methods we used.

Case presentation and study method

There are approximately 44,000 inhabitants in the municipality of Lolland, which covers 892 km². Large parts of Lolland are located below sea level and one sixth of the land is drained by pumps. Two thirds of the rainwater falling in the municipality is pumped into the ocean. This makes the whole area of Lolland especially vulnerable to the effects of rising sea levels and heavier downpours. The biggest town Nakskov has roughly 13,000 inhabitants. Nakskov is, as mentioned, one of ten areas in Denmark that have been identified as having the highest risk of extensive losses from flooding (Miljøministeriet et al. 2011). During the storm surge of 2006 – which hit not only Nakskov but several other towns and villages – the sea level rose up to 1,6 meters above the normal level (Nielsen and Huess 2008), which resulted in damages of more than € 2,5 million for the residents of Lolland (Stormrådet 2009).

The study was conducted as a case study, as it gave us the opportunity to go into detail with regard to people’s understandings of flood risk and climate change in a specific landscape (Thomas 2011). The case study was based on fifteen interviews of homeowners. By using a qualitative method, it was possible to gain insight into the meanings and interpretations of the actors in focus to improve our understanding of their actions (Kvale 2008). Eleven of the fifteen homeowners live in Nakskov and four live in Onsevig, a small village located on the Northern coast of Lolland. These two locations were chosen because they are, in different ways, characteristic of the types of experiences people in Lolland have had with flooding. Nakskov has had flood prevention systems such as pumping stations and dikes in place for many years. Onsevig has experienced a number of floods before, but it was only when the flood of 2006 occurred a dike was built around the villages. Living behind a dike is still something new for the people of Onsevig.

All the interviews, except one, were conducted in the homes of the interviewees and all lasted one to one-and-a-half hours. The interviewees were initially asked what kind of changes they had made
to their houses. To this were added questions about their experiences with floods, their perceptions of living in a flood risk area and their perceptions of climate change. All the interviews were transcribed and subsequently analysed. All interviewees have been anonymised and the names used in this article are pseudonyms.

Theoretical frame

Lolland as a hybrid landscape

We take our point of departure in Bruno Latour’s (1993) concept of hybridity. Latour argues that it is impossible to separate understandings of society from materiality. Nothing is purely social or purely material; it will always be a mixture of the two. In this way, the whole world is made up of socio-material hybrids. The problem is, Latour argues, that a central part of our understanding of how to be modern is to believe in what he calls “The Modern Constitution”. In this constitution, the natural world and the social world are seen as separate and independent entities. Following this, to be modern is to be able to develop society without depending on nature. However, in this sense, we have never been modern (Latour 1993). We believe that by developing yet more complex technologies, we are improving our control over nature and our ability to develop societies independent of the material world, but in reality we are just creating additional and more complex hybrids. These new hybrids often react and develop in unexpected and dangerous ways. According to Latour, climate change is an example of such a hybrid. When the possibilities of fossil fuel were first explored, no connection to the atmosphere was made. We are now beginning to see the effects of fossil-fuel emissions on the global climate, making the belief that the climate is independent of human activities untenable. The main problem is that we often fail to notice the point at which hybrids become dangerous because we are desperately holding onto the belief that nature and society correspond to two different realities (Latour 1993).

The landscape of Lolland can no doubt be understood as a hybrid. Large areas used to be part of the sea but have now been reclaimed. People’s houses are located in places that, without human labour, would be under water. For more than 200 years, the residents of Lolland have been working on constructing a hybrid landscape that consists of reclaimed sea bed, emptied lakes, dikes, pumping stations and all the facilities that are part of human dwellings. Erik van der Vleuten and Cornelis
Disco (2004:291) argue that the development of Dutch society and its “human ‘networked’ wet nature” are deeply intertwined, and that the one cannot be understood without the other. The Dutch people’s understanding of their landscape and the extent to which their properties are at risk from flooding are a result of their long history of living in, shaping and trying to control the wet nature they are surrounded by (van der Vleuten and Disco 2004). In the same way, we argue that it is pivotal to recognize the hybridity of the landscape of Lolland if one is to understand the responses of both the landscape and the people.

Living in a weather-world

Tim Ingold’s (2000) theoretical aim is also to challenge the separation between nature and culture, and he is especially interested in how landscapes are shaped and understood. He writes that nature most often is defined as something that is ‘out there’ and is separated from society. Instead, landscape is something we live ‘in here’. “Through living in it, the landscape becomes a part of us, just as we are a part of it” (Ingold 1993:154). By dwelling in a landscape, humans transform it, but the landscape also forms the people living in it. Furthermore, a central part of Ingold’s theory is that the world is never a static model around us, but rather that we and the encompassing world both move and are in constant transformation. This is definitive for how we perceive ourselves and our surroundings (Ingold 2007).

Ingold (2007) focuses especially on the weather. He argues that the rain, the wind, and the sun are also not things ‘out there’; rather, they are things we act in. The weather influences our actions and our ways of being in the world. He defines this as us living in a weather-world. Ingold uses this perspective when he discusses different understandings of, and responses to, climate change. Building on a case study of Sami People together with Terhi Kurttila (2000:187), he argues that “whereas scientists were out to detect changes in climate, what mattered to local people were the changes in the weather.” Scientists interested in climate change have a quantitative perspective on this, he argues. They are interested in recording the changes of different variables over a long period of time. In contrast, changes for most other people are understood through their lived experiences with the weather in the immediate present. In this way, the climate is recorded, whereas weather is experienced. Climate change is not only difficult to relate to because it is a global issue, as Macnaghten (2003) argues, but also because it is understood through statistical data and not through senses and memory as the weather (Ingold and Kurttila 2000).
Finally, Ingold’s understanding of the role of imagination should be noted. In relation to climate change, it is not only memories of the past that are relevant for our actions and understandings in the present, but it is also the way in which we imagine the future. Here again Ingold (2012) argues that imagination is not something separate from our daily practices or the landscape we live in. Governments and planners are interested in what they call climate scenarios. They want images of a fictive future that might occur in 20 or 100 years. People living in a landscape do not imagine a fictional future, detached from the present in such a way. Instead, they imagine the future is a result of their perception of the continual transformation of the world of which they are a part. Ingold writes: “[a]n imagined landscape, then, is a landscape not of being, but of becoming” (Ingold 2012: 10). This perspective challenges the way politicians and scientists often talk about climate change, that is, as if there were a static “now” and a “future” of disruptions with rising temperatures, sea levels and more extreme weather events. Following Ingold’s line of thought, we instead have to understand perceptions of (climate) change now and in the future as growing out of everyday experiences in a world that has been, is and will keep constantly transforming.

**Perceiving and responding to changes in a local landscape**

Ingold’s theory points to the existence of different understandings of climate change, depending on people’s experiences with different types of materiality. In most cases, climate scientists and local people are not even talking about the same thing when they discuss the issue. The first group talks about the global climate, the second about the local weather (Ingold and Kurttila 2000). We started this paper by referring to prognoses from the IPCC and the Danish meteorological institute, as well as the EU Flood Directive report. They clearly represent the scientific understanding of climate change and presents an image of a fictive future. In opposition to this, Ingold places the understandings of laypeople responding to changes in their local landscape. In the following analysis, we will use Ingold to understand why the residents of Lolland perceive the extent to which they are at risk from floods differently than the way it is presented in the prognosis of the climate researchers. As stated by Ingold, laypeople’s imagination of the future grows out of their present experience with their local weather-world.

However, Latour (1993) argues that people’s understandings of their present and their expectations of the future are as much a result of the modern constitution as it is a response to lived experiences. The belief that society and nature can be separated is so strong that people are able to overlook the
fact that everything in the world is a hybrid. So where Ingold argues that humans and landscapes develop by continually responding to and adapting to each other, Latour’s perspective is that we, as a result of the modern way of thinking, have lost the ability to respond to changes in the air, sea, rain and other non-humans, as we do not find it relevant for social development.

To further understand this relation between present experiences and expectations of the future in Lolland, we include Latour’s understanding of technology. Latour (2005) argues that technology is an indispensable part of contemporary society, but in most cases we do not give much thought to the role it plays in our everyday lives. At the same time the technological revolution was central in developing the modern constitution. It was technological innovation that gave us the feeling of being able to control what we defined as “nature” (Latour 1993). In this way, water-managing technologies such as pumps and dikes are central if we want to understand the relation people in Lolland have to their local landscape and the way they perceive the risk of flooding in this landscape. These technologies do not only make Lolland habitable by keeping the water away, they also play a role in mediating the experiences people of Lolland have with local changes in the weather. Even though the technologies are a central part of the hybrid landscape of Lolland, they simultaneously play a role in keeping this hybridity out of sight in the everyday lives of the local people.

In this way, the combination of the theories of Ingold and Latour can help us understand how the residents of Lolland build their understandings of climate change as well as the risk of flooding through personal experience with the local landscape. It can also help us understand how those experiences are mediated by technology and a fundamental belief in the possibility of controlling the water. We will now develop these thoughts further in relation to our empirical data.

**Empirical analysis**

**Understanding climate and experiencing weather**

*Believing in global climate change while feeling safe locally*

When asking homeowners whether they believed they would experience climate change in Lolland, they all agreed on two things. The first was that climate change is happening – no one denied that.
The second was that climate change would not have any major influence on their everyday lives in Lolland. Poul expressed this common view:

I think it will mean something for us economically. Everything is already becoming more expensive. We need to do something in one way or another and there is only us to pay. But physically, I don’t think it will.

Here, Poul expresses the belief that while global climate change may result in economic implications for society, it will not lead to more extreme weather where he lives. The time perspective is significant. In 1996, Steve Hinchliffe (1996) concluded that a major reason behind people’s apparent indifference towards climate change was that they did not expect to witness its effects during their own lifetime. In terms of the present case study, this perspective appears unchanged, as the majority of respondents do not expect to experience the physical effects of climate change during their lifetime. As noted by Vivian when asked whether she knows that Lolland is identified as a flood risk area:

After all, it will not be in our time, but when one day… And you can say, well – the tsunami is not very likely coming to Nakskov. I don’t think so. No. But if – when, not if – but when the sea level one day rises as they say, you can say that Nakskov or Lolland after all is at high risk, right. Because it is so flat. Flat, flat, flat. But we will surely not think about that. It will not happen in our time.

In these two quotes, the homeowners mention three things: climate change, floods and their understandings of the extent to which they are at risk. However, it is clear that the connections made by the homeowners between these three elements are not the same as the connections for those behind the report designating Nakskov a high-risk area (Miljøministeriet et al. 2011). When they talk about climate change, they adopt what Ingold and Kurttila (2000) understand as the language of climate scientists; that is, they talk about global changes of the climate in the form of rising sea levels, droughts and hurricanes, which are realities for people far away from Lolland. As expressed by Poul, these types of disasters, which are present in other parts of the world, may affect Denmark economically, but certainly not physically. They believe that scenarios presented by the climate researchers are true and that the climate is indeed changing on a global scale, but when they look at their own immediate environment they do not perceive the same kinds of changes. To understand this in more detail, we will now look at the way the homeowners directly perceive their local landscape and weather.
Experiencing floods and knowing landscapes

Some of the studies mentioned above concluded that the main challenge for politicians and planners wanting to involve laypeople in climate adaptation and mitigation is that climate change cannot be seen on a local level (Hinchliffe 1996; Brace and Geoghegan 2011). This is also the case for homeowners in Lolland. As Eva notes: “I know there is talk about the rise of the sea level, but there has been no rising of the sea level at all.” Eva lives almost on the coast and has been living in the same house for more than 20 years. She finds it difficult to believe that climate change will have an effect on her local area because she has not seen any changes herself. Here, global climate scenarios are being related to experiences in a local landscape. As Brace and Geoghegan (2011) argue, the dominating scientific understanding of the climate is a statistical description of means and variability over a period of approximately 30 years. Eva is comparing this to her everyday experiences with the sea just outside her house. Like Eva, most of the other interviewed homeowners do not see a connection between their everyday experience with their immediate landscape and weather and the global climate changes they hear about in the media.

However, it is important to note the way that the residents do relate climate change to flooding. When the homeowners in the interviews are asked whether they think they will experience climate change, they talk about rising sea levels and more frequent heavy downpours. In this way, their understanding is similar to that of the Danish government and the municipality of Lolland, both of which expect to see climate change affect Denmark in the form of more frequent floods. In light of this, it is relevant to examine how the homeowners understand their previous experiences with flooding. Six of the interviewees had experienced the flooding of their own homes while the remainder had experienced floods in other parts of Lolland, either once or several times while they had been living there.

When considering their flood experiences, most respondents do not consider climate change as a relevant factor. Instead, the floods are understood and explained in terms of meteorological chance. In the following, Ulla talks about the flood in 2006:

Surely I do not think that this flood was a consequence of climate change. I rather see it as something that happens about every 100 years, when the weather is such that the water is incidentally dammed up and then the wind and current turn around and send it all flying back in our faces.
Ulla sees the flood as a result of the variability of the weather rather than a result of climate change. She has this in common with most of the other homeowners in this case study. For the residents of Lolland, rising and falling sea levels have always been a part of the ways in which the landscape around them is transforming. Their experience is that sometimes the sea level rises a bit more than usual and then flooding occurs, but they do not see that as anything new. Floods and storm surges have always been a part of life in Lolland.

Since most of the homeowners come from families that have been living in Lolland for several generations, they do not only refer to personal memory but also to a form of collective memory when reflecting upon flood experiences, i.e. historic events that are retold by relatives and the local media. Morten, one of the homeowners in Onsevig, explains that he got annoyed when the storm surge in 2006 was framed by some people as an effect of climate change:

My grandparents moved to this place in 1944 […]. So my mom was born and raised here, and has lived here all her life […]. We therefore know the area, and for that reason I can get a bit angry at all those newcomers […], they have so many opinions about everything, and know everything, but they don’t know the background, they don’t know how things were before […] the stories of how the high tide has been at other times.

In this way, Morten is not only referring to his own experience, but also to the experience of his parents. Their combined experiences with their local landscape gives Morten a feeling of knowing the rhythms of the sea and the land going back generations, and he sees each single flooding event in relation to this.

The residents in Lolland do not only have experience with areas that regularly flood, but they also have years of experience with areas that never flood. Poul and Helle reported that parts of Nakskov used to be a big lake that is now drained. They were not sure whether they lived in or outside the drained lake, but after consulting a map they realized that their house is in fact situated in the former lake. This realization does not, however, cause any concern. As Helle comments: “Yes, we actually do. […] But it is all right. It is fine.” They have never experienced any flooding, so new knowledge about living in an area that is a reclaimed lake does not make her think that it will be a problem in the future. Poul and Helle still do not perceive their dwelling to be more at risk than other places. Morten’s understanding of his local neighbourhood has been formed by many years of experience; the same is true for Poul and Helle. Morten’s experience tells him that the water can be
an issue; Poul and Helle’s experience is that, where they live, water is not something to worry about.

**The weather-world of Lolland**

The inhabitants of Lolland believe that global climate change is happening, but their experience of living in the weather-world of Lolland tells them that this is not something they are going to experience in the form of more extreme weather, at least not in their own lifetime. They live in a landscape that is in constant flux, but it is also a landscape where they know the scope of variation – which areas usually flood and which areas do not. Their various understandings are built on many years of experience with their local landscape – personal experience coupled with local collective memory.

The report designating Nakskov a high-risk area is founded on climate scenarios that, as Ingold and Kurttila (2000) argue, are images of a fictive future detached from the present. The planners and politicians that are responding to those climate models are reacting to a problem that neither is visible at the moment nor is it certain how it will turn out in the future (Leyshon (née Brace) and Geoghegan 2012). In contrast to this, local people’s expectations of the future are growing out of everyday experience with their landscape. They know that they live in a landscape that has always been at risk of flooding; they can therefore imagine that global climate change may have local effects in the form of floods sometime in the future. At the same time, their experience with the weather-world of Lolland tells them that the local flooding is a result of the ever changing weather and not extraordinary.

In the next section, we will discuss how the homeowners’ perception of the extent to which they are at risk from climate change is not only a result of prior and present experiences with the local weather and sea, but is further shaped by their trust in different water-managing technologies and their belief in their own ability to control the water.

**Creating liveable landscapes by managing the water**

**Individual responses to a changing landscape**

Seven of the fifteen homeowners have taken measures to reduce the risk of flooding or mitigating the damages resulting from flooding. Out of those, six have personal experience with floods. This
supports the findings from earlier studies where flood experience is seen as the main factor for compelling homeowners to take precautionary measures (Kreibich et al. 2010; Grothmann and Reusswig 2006). The fact that all the homeowners who have past experience with flooding have taken precautionary measures supports Ingold’s (1993) theory about how people respond to changes in their local landscapes. In the village of Onsevig, all four interviewed homeowners had been involved in the building of a new dike on the coastline bordering the village. This represented a response to the serious flooding in November 2006. The homeowners living in Nakskov have not been involved in the building of collective flood protection systems to the same extent as the homeowners in Onsevig. Instead, they have taken individual precautionary measures. They have reduced the flood risk they face and the potential damage caused by flooding by installing drain locks, lifting all electrical installations above the floor and removing valuable possessions from the basement.

The responses of homeowners with flood experience in both Nakskov and Onsevig illustrate how they have been able to reduce the risks they face in the future through both small and large scale initiatives. After the people of Onsevig witnessed most of their village being flooded, they managed to find the funds necessary to build a dike. One of the homeowners in Nakskov explains that he has used over € 7000 on a drain lock. This demonstrates that it is not personal capacity preventing the homeowners of Lolland from taking precautionary measures. The question is therefore still, what keeps the other interviewed homeowners from engaging in their own flood protection measures. Even though they have not experienced flooding of their own homes, they have experienced flooding in areas close to where they live. To answer this question, we will employ the theory of Latour to discuss the role different water-managing technologies, such as pumping stations and dikes, play in the way people in Lolland perceive the flood risks they face.

**Trust in collective water-managing technologies**

As mentioned above, Lolland is best understood as a hybrid landscape. To avoid floods, large areas of Lolland and nearly all of Nakskov depend on pumps that must be functional at all times and dikes that have to be well maintained. Poul and Helle pay a local pumping station. Even though they were not aware that they lived in the area of a drained lake, they noticed and acknowledged the pumping station. Poul explains:
They come every day, more than once a day I would say, to control that the pump is doing its job, because if the water rises there, then it is obvious, then we are also not able to get rid of the water here. [...] So in this way I think we are pretty safe, because so many are dependent. It is not only us, it is the whole area that has to be drained through this system.

Here, Poul shows a clear trust in the pumps and the people managing them. Most of the interviewed homeowners explained that they were paying members of a dike or a pumping cooperative and none of them expressed any kind of concern about the function of the pumps or the dike. They believe that those water-management technologies are able to do the job to the extent that they do not need to take any individual measures.

Van der Vleuten and Disco (2004) argue that Dutch residents in the same way have come to confer what they define as “blind trust” in their hydraulic infrastructure. Those technologies have become so natural for Dutch people that they have today disappeared from their thoughts and have instead come to play a subordinate role in both individual and government decision-making. Van der Vleuten and Disco (2004) further argue that this can be dangerous, especially in a future with climate change. They maintain that even though the existing hydraulic infrastructure has reduced the risk of floods, it may still be the cause of several dangers and uncertainties in the long run. They point out that this kind of hybrid is not only vulnerable to extreme weather events, but also to a lack of maintenance, management errors and sabotage. They write: “When things do go wrong – as inevitable it seems they will – the losses will be greater and in the same measures the tendency to blame the human network builders and their unruly technology instead of, as in former times, unruly nature” (van der Vleuten and Disco 2004: 304). In addition, other flood risk studies point out that the building of flood defences can make people develop settlements in flood risk areas, which would not have been developed in other cases. Seeing as no flood defence is fool proof, this can potentially increase the damage flooding can cause (Lane et al. 2011). As a result, it is important to investigate the ways in which water-management technologies have become a natural part of the landscape of Lolland.

When Ole and Sanne told us about the flooding of a nearby sports centre, they talked about the breakdown of pumps rather than the unusual weather. When asked whether they thought it could happen again, they told us that the pumps had been changed and are now quite new. At no time during the interview did they express concern that their own house could be flooded as a result of failing pumps. Consequently, they trust the present technology to keep them safe in spite of their
own experiences. In addition, the people living in Onsevig, who have all experienced a flood, now feel safe behind their dike. This is illustrated by Eva’s answer to the question of whether she believes there will be another flood:

Yes, you might fear that there will. Not in a way that it will become uninhabitable here. We can easily live here, because we have done, I think we have taken some good precautions to protect ourselves. It will not happen again.

Furthermore, the quote shows that the homeowners trust their own ability to reduce or completely remove the risk of floods by installing or building collective water-management technologies. This experience also makes them feel confident that it will be possible to control the water in the future. When talking about the risk of more damaging floods, Sanne argues: “I think they know more now, they know by now how to pump it away. They also talked about making the dikes higher.” As Troels further points out: “I think it will happen so slowly that we will have time to take the necessary measures.” The common view among the homeowners is that it will be possible to solve the challenges climate change might pose by adjusting the water-managing technologies to this new situation.

In this way, the pumps and dikes are not only keeping the water out of the houses, they are also an important factor in shaping the understanding that water can be controlled – both now and in the future. Even though Lolland has the potential to be a dangerous type of hybrid landscape, the pumps and dikes enable the residents to believe in ‘the modern constitution’ (as Latour define it): that it is possible to control nature with the help of technological innovations. They therefore do not worry about climate change, nor do they see any need to take further individual measures to protect their own homes or families. Even when a pumping station breaks down and the water flows into a nearby public building, Ole and Sanne do not relate such an incident to an increased personal risk, but rather maintain their trust in the pumping system. In this way, trust in different water-managing technologies seems to hold more weight than personal experience.

Ingold argues that we adapt to our environment in different ways so as to manage the continual changes. The individual measures taken by the homeowner with personal flood experience can be seen as this kind of managing of landscape changes. Through Ingold we are therefore able to understand why people in Lolland act the way they do in response to living in a flood-prone area. However, to understand why people like Ole and Sanne do not feel the need to take precautionary measures, we need to include the theory of Latour. In line with Latour, the responses of the
homeowners may be built on a fundamental belief in being able to control nature with the help of modern technology. The people of Lolland trust the existing technologies to the extent that they do not feel the need to take additional individual measures. This is the case both for those homeowners in Nakskov, who have many years’ experience in trusting collective water-managing technologies, as well as for those in Onsevig, where the same technologies were recently built.

**Collective water-managing technologies replace experiences of local changes**

What further complicates matters is the way different water-managing technologies not only make people in Lolland believe they are able to control water, but also prevents them from experiencing important changes in their local landscape. When asked directly, all homeowners revealed that they are aware that they live in a very low landscape and they know they are paying to a pumping or dike cooperative. As the above quote from Poul shows, they acknowledge the work of the pumps and the people managing them, and that both are important in keeping their homes dry. At the same time, none of the homeowners – apart from those in Onsevig who had just finished their dike – mentioned any of the water-managing technologies prior to being asked directly. This suggests that the functioning of such technologies is not something they think about in their everyday lives. As Latour (2005) argues, the technologies go unnoticed as long as they continue to work as expected. This perspective is further supported by the fact that Poul and Helle were unaware of their house’s location prior to this interview. Consequently, there is an important difference between those collective technologies and the individual measures taken by a few of the homeowners.

The homeowners who have taken individual measures, such as drain locks, view those measures as requiring maintenance and upkeep in order for them to function properly. In comparison, the homeowners who rely on the pumps and dikes were not involved in their functioning in any way other than paying the cooperative’s yearly bill. Paying a pumping or dike cooperative could be viewed as an active adaptation measure taken by homeowners, but it is not framed as such by the homeowners themselves. Where the individual measures taken by the homeowners themselves are explained as a response to a specific flood event and a fear that this kind of event will happen again, the pumps and dikes are talked about as a natural part of the landscape. In this way the individual solutions are not only a response to experiences with local weather changes, but they also act as a reminder to the homeowners of those changes. When, for example, a heavy downpour occurs and the water rises in the sewage system, the people with drain locks will notice because those
individual technologies alert the owner and need to be maintained afterwards. In contrast, the homeowners who depend on collective solutions will in most cases not notice the unusual situation. The local pumping stations will take care of rising water levels by adjusting the capacity of the pumps beforehand.

In this way, the collective water-managing technologies directly mediate the way people in Lolland experience changes in their local landscape. They are seen as a natural part of the landscape, over which the residents have no responsibility. The technologies are part of the hybrid landscape of Lolland, but at the same time they also play an important role in keeping this hybridity out of sight in the everyday lives of the residents. Ingold argues that societies adapt to changes in their material surroundings, but in Lolland the water-managing technologies already in place prevent the people from experiencing many of those changes.

**Conclusion**

Where Macnaghten (2003) argues that people need to connect global climate change to local issues before reacting, Whitmarsh (2008) maintains that people living in flood-prone areas are not more concerned about climate change. A number of other studies have suggested that it might be a matter of denial or the feeling of not having the capacity to change the situation (Grothmann and Reusswig 2006; Norgaard 2011). In this article, we have explored and challenged those conclusions by using the theories of Ingold and Latour. We argue that the lack of concern about the local effects of climate change is not a matter of denial or mistrust in one’s own capacity. Rather, it is a result of one’s experience with the local landscapes and one’s trust in water-managing technologies such as dikes and pumps.

The residents of Lolland do not connect their everyday weather experiences with the climate change they hear about in the media. They believe that global climate change is going on, however, they cannot relate it to their own everyday lives. As argued by Ingold (2012), the reason lies in their tendency to build their view of the future on their present experience with the temporality of the landscape they live in. They are used to experiencing smaller and bigger floods. They understand it as just being the normal variability of the weather; not something that can be connected to climate change. In this way, they do not experience anything that allows them to imagine a future very different from the present. It is therefore not that they do not understand the climate scenarios
presented by climate scientists or that they cannot find a good way to react to this knowledge. Rather, it is simply that they find this information irrelevant to their everyday lives.

By including the theory of Latour, we have been able to take the analysis one step further. Ingold argues that people respond to changes in their local environment, but in Lolland the homeowners do not experience any changes. We argue that the reason for this is not only the difference between weather and climate, but also that the experience of changes in the local landscape is mediated by the collective water-managing technologies. The dikes and pumps in Lolland have become such a natural part of the landscape that their functioning goes unnoticed by the residents. In most cases, the homeowners fail to see or feel the critical weather situations because the pumps and dikes successfully keep water away. They therefore do not experience any landscape changes to which they are required to respond. In addition, the collective water-managing technologies make the homeowners feel as if it is possible to control the water. Where Ingold argues that people always adapt to changes in their local landscape, Latour remains sceptical. According to Latour (1993), our trust in, what he refers to as, the modern constitution is often so strong that we believe societies do not have to respond to any changes in their material surroundings. The tendency of the residents of Lolland to trust their pumps and dikes may be rooted more in the modern confidence that we are able to control nature than in the ability to read changes in local environments.

If homeowners individually take precautionary measures before a flood, they can reduce their losses by up to 50 % (Kreibich et al. 2010). There is thus a great possibility of reducing flood damage if homeowners take action to adapt their homes before their first flood incident. With the present understanding of Lolland’s residents in this case study, it is very unlikely they will take any further individual measures to secure their homes. They do not see a need, as they do not experience any important changes in their local environment, and they trust the collective water-management technologies to cope with any possible changes in the future. In spite of living in a designated flood risk area, flood risk does not seem to play any major role in the everyday lives of the homeowners of Lolland.
The practice of dwelling and the nature of decision making

A practice theoretical approach to maintenance, refurbishment and reparation of private homes in the context of climate change

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Submitted to Journal of Environmental Policy & Planning

Abstract

There exists a political desire to make buildings more energy efficient and resilient to extreme weather. For existing private housing this is done through refurbishment and retrofitting. In response, various projects and policies aiming to influence decisions made by homeowners in relation to refurbishment. Focus on decisions seems to be based on a perspective where actions are understood to be the result of isolated decisions. By means of case studies from Denmark and Norway we challenge this point of view. Based on a practice theoretical approach we argue that homeowners’ actions should be seen as the result of existing material conditions, meanings and competences. Rather than focusing on decisions and acts pertaining to refurbishment alone, we take one step back and observe the whole process of keeping a home habitable. Inspired by theories of Tim Ingold and Elizabeth Shove we call it the “practice of dwelling”. We see maintenance, refurbishment and reparations as part of an ongoing practice of dwelling. In this light, decision making is just one of many aspects that contribute to shaping the actions of homeowners when they invest time and money in their properties.

Key Words

Dwelling, Practice theory, Tim Ingold, Climate change, Refurbishment, Homeowners, Climate change policy
Introduction

In the context of climate change the question of how homeowners refurbish and keep their homes in repair is receiving increased attention from policymakers, insurance companies, pro-environmental NGOs and city planners. The ambition among these actors is to influence homeowners to refurbish in such a way that the homes will use less energy and become more resilient to extreme weather. Efficient policy depends on an appropriate understanding of the situation the policy is aiming to change. This makes the question of what is actually happening when people refurbish and maintain their homes, and why they do what they do, highly relevant. In the formulation and implementation of climate-related building policy, we see a tendency to focus on the decisions that homeowners make with regard to refurbishment. Information campaigns and subsidies attached to certain technologies tend to aim at homeowners who are about to make decisions regarding larger refurbishment projects. The expectation is that when the homeowner is weighing up different options against each other, information and subsidies are taken into account that may influence the decision in favour of more sustainable solutions. While acknowledging that decisions are made and can in some cases be influenced by existing policy tools, we argue here that it is relevant to take one step back and look beyond the scope of just the isolated moment in which a decision is made. Rather, we should focus on the whole process leading to, or away from, refurbishment and maintenance. Such a focus implies a shift away from decisions to the practice of keeping a house habitable.

Our perspective combines Tim Ingold’s concept of dwelling and Elizabeths Shove’s thoughts about stability and transformation of practice. Practice theoretical perspectives have tended to focus on everyday practices such as driving, showering and cooking, but attention is increasingly also being turned to refurbishment, as exemplified in a recent special issue of ‘Building Research & Information’, edited by Kirsten Gram-Hansen (2014). Here, Gram-Hansen also refers to refurbishment, retrofitting, etc as part of a continuous process connected to everyday life. When you live in a property you have to perform smaller or larger alterations all the time, such as replacing a broken window or repairing a leaking tap. Inspired by Tim Ingold (2000), we approach the constant attention to transforming our homes to match our changing needs and life situations as “dwelling”. Dwelling in a house is an ongoing process we understand as a practice, thus the “practice of dwelling”.
Through this perspective we aim to understand the actions of homeowners when they improve their property or keep it in repair. We build our argument on three case studies; one from Norway and two from Denmark. All three cases focus on different aspects of responses to climate change and climate change policies, but we also find that the analysis will be of interest in the broader field of decision making and building research.

We start with a discussion of the use and limitations of a narrow focus on decisions. We then suggest looking at the practice of dwelling as an alternative approach in examination of the actions of homeowners. Based on the three case studies we argue; (1) that decision making is best understood as embedded in the ongoing practice of dwelling; (2) that “readiness” for decision making is a result of many smaller transformations of meanings, materials or competences, which sometimes lead and sometimes do not lead to a moment where a decision is made; (3) and that regular decision opportunities do not necessarily result in values being translated to actions, as changes in the practice of dwelling tend to demand focus and time, both of which are often limited in the busy everyday lives of most homeowners. We end the article by indicating a number of ways in which a shift in focus from decisions to practice can be integrated into policymaking.

**Political interest in decision making**

In strategies and plans related to climate policies there is in general a great deal of focus on decision making. In a strategic document about energy renovation of private housing Copenhagen Municipality writes: “The municipality’s best chance for creating a reduction in the CO² emission is to influence the relevant decision makers” (The City of Copenhagen 2009:69). ENOVA, a Norwegian public enterprise set up to promote the transition to more sustainable energy use, also refers to homeowners as “decision-makers” and focuses on “decision processes” in strategic documents. For example: “The barriers, and the relationships between them, are revealed through an analysis of decision processes that shows how decision-makers in practice choose, or opt out of, measures that may improve the building’s energy condition [our translation]” (Enova 2012:67). It seems that decisions and decision processes play an important role in the formulation and implementation of climate-related policy aimed at homeowners.

Focus on decisions and decision-makers corresponds with an understanding of behaviour as being a product of well-thought-through decisions. Decisions are seen as isolated events in which all
possible options are weighed against each other and the best one chosen, i.e. the option that optimises benefits and minimises costs. With this understanding of behaviour, it is natural to aim policy at making the desired options seem better than the alternatives. This perspective on decisions and behaviour has faced growing criticism and many of its basic assumptions have been challenged through laboratory experiments, field studies and market analyses (Shove 2003a, Loewenstein 2001). Several studies have pointed out that action resulting from a rational weighing up of choices may be the exception rather than the rule (Loewenstein 2001, Simon 1955). Studies of decision making in real life (rather than experiments) indicate that most decisions are not reached by weighing options against each other side by side, but rather that options are evaluated in sequence until a satisfactory one is found (Orasanu and Connolly 1993, Simon 1976). As such, the idea of the decision as an event is challenged; instead the process is seen as spread over a longer time span consisting of many phases. Moreover, such a perspective makes it difficult to account for decisions not being made or for a course of action being chosen without anything like a decision being made. Such action may rather be subscribed to automatic (Bargh and Chartrand 1999, Kahneman 2002) or habitual behaviour (Louis and Sutton 1991).

The above supports taking a critical perspective to the focus on decision making that dominates in climate change policies. This article therefore aims to present an alternative theoretical framework within which to understand how and why homeowners transform their dwellings. We do not challenge the idea that decision making plays a role in home refurbishment and maintenance, even an important one. However, we do question that decision making can explain everything that is going on, or even more importantly, not going on in practices relating to refurbishment and maintenance of private homes. In so doing, we shift focus from seeing actions made by homeowners in relation to their homes in light of decision events to seeing decisions and actions as embedded in a dwelling practice.

**Dwelling as an ongoing process**

When policymakers wish to influence the standard of private homes, two episodes in the history of the building tend to be focused upon; firstly the time when the home is built and secondly when new people move in. It is at these times that decisions are expected to take place that shape the quality of the home (Danish Ministry of Climate et al. 2013b:38). This view fits what Tim Ingold
(2013b) calls a “building perspective”. Ingold argues that the building perspective is dominant among architects and engineers, who see a home as something that first is built, whereupon people move in and live in the finished product. Ingold is critical of this perspective. As an alternative, he suggests a perspective in which there is no clear distinction between building and dwelling, as in most cases a home continues to evolve as people live in it, with the dwellers “keeping it under repair, decorating it, or making structural alterations in response to their changing domestic circumstances” (Ingold 2000:187). Ingold calls this view a “dwelling perspective”.

Several studies support Ingold’s argument by pointing out how the process of transforming a property is central to making it into, and keeping it, a home (Petersen 2008, Skov 2010). We do not argue against the idea that the event of moving into a new house is a time for major refurbishment work, but that these moments are not the only situations where homeowners transform their homes. How many homeowners can say that they have not made any changes at all to their homes during the last year? Life changes, people living in a house have children, they get older and demand more space and new solutions, after a while they move out. Not only are the lives of the dwellers changing, technologies and local infrastructure also change. In addition, the house needs to be maintained. Things breakdown or wear out and have to be repaired. To dwell is an ongoing task that continually demands work to be carried out on a house. A house where nobody dwells will fall into decay.

Maintenance and repair are absolutely central in the flow of everyday life, and activities that are often forgotten or overlooked (Graham and Thrift 2007). A survey of Danish homeowners shows that 70% see maintenance as a continuous process of small reparations (Gallup 2012), which indicates that a large amount of work on homes is carried out outside major refurbishment projects. In this way, we argue that if policy measures aim mainly to influence homeowners when engaged in major refurbishment projects or only when people move into a new house, a great part of the money and energy homeowners puts into their homes is overlooked. As an alternative we suggest looking at the broad practice of dwelling in order to understand homeowners’ refurbishment and maintenance actions. We therefore now present the theoretical perspective of practice theory.
The practice of dwelling as analytic tool

There is no such thing as a unified theory of practice but rather a “broad family of theoretical approaches connected by a web of historical and conceptual similarities” (Nicolini 2013:1), including those of Pierre Bourdieu, Anthony Giddens, Bruno Latour, Andreas Reckwitz and Theodore Schatzki. Common for all theories of practice is that they are set up as alternatives to always seeing actions as a result of decisions. Practice theories challenge theoretical perspectives that either see values and norms or economy as the main drivers for human action (Reckwitz 2002b). Different practice theory studies have shown how many of the actions we perform in our everyday life are not the result of carefully considered decisions or values but rather habits or embodied knowledge, within the present techno-social systems (Hand et al. 2005, Halkier and Jensen 2011).

There are various definitions of “practice”, but a common feature of these is that they understand it to be a set of bodily-mental activities that connect a number of different elements (Røpke 2009:2492). Elizabeth Shove, Mika Pantzar and Matt Watson (2012) define practice as consisting of three elements; meanings, materials and competences. Competences are defined as understandings and practical ability, and meanings as “the social and symbolic significance of participation at any one moment”. Finally, the material element encompasses objects, infrastructure, tools, hardware and the body itself (Shove et al. 2012:23). In this article we use Shove et al.’s understanding of practice, as we find its simplicity useful in the analysis of empirical data. However, it should be noted that the elements are applied as analytic categories, and should not be assigned the ontological status of objects in the world. There may be other useful ways to slice a practice into elements.

As a practice has to be performed regularly in order to exist, most practice analysis has focused on practices we do every day (Gram-Hanssen 2010b, Warde 2005, Shove 2003a). However, Judson and Maller (2014), Vlasova and Gram-Hansen (2014), and Bartiaux et al. (2014) argue that also refurbishment and retrofitting may be conceived as practices. We adhere to this with our argument of the existence of a practice of dwelling. When we address refurbishment in the context of the practice of dwelling, we follow Ingold’s (2000) perspective on dwelling as an ongoing activity, with continuous attention to caring for the home binding together smaller and larger acts of repair, refurbishment and maintenance (Heidegger 2001, Ingold 2000). When applying the practice of dwelling as an analytic tool, we examine how climate change as well as adaptation and mitigation
Explaining stability and change

Shove and several others performing practice studies have been interested in the connection between environmental values and energy-saving actions. These studies indicate how practice theory can help us understand why values so often do not translate into action. The main point of these studies is that in most cases our energy consumption is part of everyday practices upon which we do not reflect and that energy consumption is so deeply entwined in the existing socio-technical systems that it is very difficult for individuals to change (Gram-Hanssen 2011, Holden and Linnerud 2010, Hand et al. 2005, Shove 2003a). In this sense practice theory is a strong tool in explaining the stability of practice. Shove argues how the meaning connected to a practice is often built on broader social conventions involving e.g. cleanliness or comfort. Similarly, competences connected to a practice are often acquired over a long time period. Finally, materiality plays a central role in keeping practices stable, as houses, infrastructure and technologies are not created or changed from one day to the next (Shove 2003a). A practice theory perspective can therefore help us explain why the practice of dwelling might be difficult for policymakers to influence.

But Shove, Pantzar and Watson do not only indicate reasons why practices can be stable, they also argue that the continual enactment of practices creates a potential for change. We are not only able to understand how practices persist, but also how they emerge, transform and disappear by looking at how links are made and broken between meanings, materiality and competences every time a practice is enacted (Shove 2010). Focus on the practice of dwelling therefore not only helps to explain stability but reveals potential for change.

We find that the combination of Ingold’s concept of dwelling and Shove’s understanding of practices and change gives us a productive framework against which we can understand the refurbishment and maintenance actions of homeowners. The essential link between the two perspectives is the ontological shift from a focus on structures, mentalities, agencies and other concepts supposed to lie behind an action to the action itself, i.e. the action or event conceived as practice. This shift can be traced to the thinking of Ludwig Wittgenstein (Wittgenstein 2009) and Martin Heidegger (1996), which has influenced both Ingold’s work (2000:186) and Shove’s
practice theory (Shove et al. 2012:4). The shift from a building to a dwelling perspective is also inspired by Heidegger (2001). However, a possible argument against combining Ingold and Shove may be that Ingold’s theoretical approach already contains a practice perspective, indicating there is nothing to gain by including Shove. Ingold (2013b) also discusses how embodied knowledge is central and how changes can take place when practices are enacted, but where Ingold focuses on the experiences and perceptions of the individual, Shove (2003a) is less interested in the individual but more in how practices are created and transformed across larger social groups. This means that where Ingold discusses how individuals use and understand things and technology, Shove studies how socio-technical systems can and do influence the practices of whole social groups and thereby create social conventions which are difficult to influence. We argue that Shove’s focus on socio-technical systems and social conventions adds a key aspect to Ingold’s notion of dwelling practices. They complement each other well and a combination of the two can bring us further than if only one of the theories was used.

Methods

To argue how the practice of dwelling can bring new insight to the understanding of refurbishment and maintenance actions of homeowners, we analyse three different cases.

Our first case is a study of homeowners and agents implementing climate-related policy for buildings in Norway, with focus on the challenge of upgrading the energy standard of private dwellings through retrofitting. From spring 2012 to autumn 2013 the second author tracked the network of policy agents2 using participatory observation as well as conducting 20 interviews with policy agents and homeowners. During this time, meetings between policy agents and homeowners were observed, and the refurbishments and experience of climate policy was discussed with the homeowners. Due to the strong DIY tradition in Norway, this case shows how the practice of dwelling is relatively stable and that decision-making has to be seen as embedded in this practice.

Our second case study looks at the response of Danish homeowners to policies aiming to promote the installation of photovoltaic (PV) solar panels on private houses. The case is based on interviews

2 The study of climate policy agents in Norway confirms Guy and Shove’s (2001) description of Nordic energy policy as being performed by a network of actors.
with 11 homeowners living in one-family houses in Nakskov, a town in the municipality of Lolland in the southern part of Denmark. The interviews were carried out in November 2012 by the first author. With this case study, firstly we show how the practice of dwelling associated with energy consumption in most cases is difficult to change, as discussion of alternatives rarely takes place and only in a very few cases reaches a moment where a decision is made. Secondly the case also reveals how practice can change.

In the final case study we move from one-family houses to a housing cooperative in Copenhagen called A/B Park with around 500 apartments. An executive committee, consisting of nine residents of the housing cooperative, is responsible for the daily management of A/B Park and meets regularly. The first author observed meetings of the committee and general meetings for a period of a year and a half, commencing in 2012. During this period the author also held interviews with the chairman of A/B Park, a number of the members of the committee, and technical advisers. The case study looks at a situation where decision opportunities do exist. We therefore want to show how also here inertia in the practice of dwelling makes it hard for new and environmentally favourable ideas and visions to influence the actual actions of homeowners.

The case studies illustrate three rather different homeowner situations, as we wish to show how the theoretical concept of a practice of dwelling can be used in different contexts. Our argument is that if the concept has proven useful in these three very different cases, then it might be considered useful in the majority of cases (Flyvbjerg 2006). Also, the three case studies were selected to illustrate in the best way the various aspects of dwelling practices we wish to highlight; firstly dwelling as an ongoing (rather stable) practice, secondly how this practice can and does change, and thirdly why it can often be difficult for values to translate into actions.

**Case 1: When decision making is embedded in the ongoing practice of dwelling**

ENOVA, the Norwegian energy transition enterprise, manages a support program for energy renovation. It builds on the understanding that the best possible cuts in household energy use are achieved by a complete and planned refurbishment of the home. The program is also supported by the Norwegian Housing Bank, which provides favourable loans. In order to achieve support homeowners have to provide documentation of the state of the house and detailed plans for the refurbishment from a certified consultant. The refurbishment also needs to be executed by
professionals in one single operation to qualify for support. Not many homeowners had taken advantage of this support program (approx. 100 applications received by August 2014). An explanation for this may be found in their practice of dwelling.

To illustrate we start with an example of a Norwegian family renovating their home. When buying their house, they knew they were going to refurbish, but the extent and exact nature of this work only gradually became apparent as the work progressed. Having to replace windows, it was a natural choice to insulate the whole wall. Having insulated one wall, it was natural to consider insulating the next wall, and so on. The materiality of the house in transformation became a force that drove the process of refurbishment. In this process, the competences and know-how of the DIY homeowners developed. Behind the whole process was the “meaning” that the family saw the house as their most important investment, and that they felt the need to develop it. This example reveals two things. Firstly, that the refurbishment process developed over time, and was not planned and decided from the beginning. Secondly, that the direction of the process was the result of a combination of existing and transforming materiality, meaning and competence.

In Norway 90% of dwellings are small private houses (detached or semi-detached, single- or two-family houses) (Enova 2012b). They are mostly made of wood and managed by the homeowners themselves. The DIY tradition is strong. According to a building instructor, DIY practice has dominated in Norway since the 1950s. We therefore argue that DIY is central to the practice of dwelling among Norwegian homeowners, and also that this practice is shaped by certain meanings, competences and materialities. We now look at those three elements of practice in turn.

Firstly we argue that certain meanings are connected to the practice of dwelling through the tradition for DIY. When asked why homeowners preferred to do refurbishment work themselves, three main reasons tended to come up. One is finances. Despite the availability of less-expensive foreign labour, labour is still the most expensive part of a refurbishment job. This appears to be even more true as the prices of building materials at DIY stores seem to become relatively cheaper compared with salaries year by year. The second reason is that DIY is experienced as fun and meaningful, at least at the beginning of a project. The third reason for the popularity of DIY can be described as the sort of pride or satisfaction attached to mastering it. This also has a social aspect, as the subject of refurbishment often comes up in social settings. When the coffee is served stories about how people upgraded their bathroom, kitchen or insulated a wall may be exchanged. You
may hear of challenges, technical problems and solutions. As such it is intimately connected to the meaning of dwelling and the satisfaction of owning your own home.

Secondly some specific competences are clearly needed for DIY work. When people buy a home for the first time they tend to be novices in the craft of DIY, but learn through experience as they fix one thing after the other in their home. Often an experienced neighbour, friend or maybe a father-in-law is consulted for advice and help. As such there seems to be a certain tradition of knowledge transfer that bears some resemblance to the master-apprentice tradition in professional building trades. We should note that also professional tradespeople tend to be consulted by homeowners, providing a certain flow of knowledge and competences from professional to amateur builders. In short, the competences the homeowners need tend to develop through practice in association with other people.

Finally, DIY deals with the material element of the house. Even though houses in Norway tend to be built quite uniformly, reflecting the particular period in which they were built, most of them have been subject to retrofitting and extension, giving them an individual touch both in terms of appearance and energy qualities. Old personalised houses can be seen as the material outcome of decades of dwelling where the homeowners have worked to keep their houses up to date. In this way the materiality of the house shapes the dwelling practice of the present homeowners. “You never know what you find in the walls when you buy a house”, a homeowner stated, commenting on how the poor handiwork of the previous owner had left a number of quite unsatisfactory solutions in the house, presenting her with a lot of work. The meaning and competences of the DIY tradition in Norway are directly inscribed in the materiality of the existing houses.

To return to the example at the beginning of this case, we argue, just as the family themselves expressed, that performing a large part of the refurbishment and maintenance work yourself is a meaningful part of the practice of dwelling. Also, as the example showed, the materiality of the house and the continually developing competences of the homeowners make this way of refurbishing and maintaining a house an unpredictable process. Surprises can be “hidden in the walls” and therefore not apparent to the amateur DIY homeowner, and new tasks continually become meaningful to do, e.g. where replacing a window with a more energy efficient one leads to work on the whole wall. These factors suggest an explanation why homeowners have not significantly taken advantage of the support program from Enova and the Housing Bank. Refurbishment takes place within the continuous practice of dwelling. In many cases it is not
planned as one big project and it is carried out by the homeowners themselves rather than professional tradespeople. The case moreover suggests how the competences and meaning of the practice develop mainly through social networks, as when a father is asked for advice or stories are shared over dinner with friends. This means that the practice of one homeowner often mirrors the practices of other homeowners. Extensive energy refurbishment is in most cases something new, and therefore not already established as part of the practice of dwelling for most people. The same goes for other climate-related retrofitting such as solar panels or flood protection, and is evidently a challenge which needs to be taken into account when formulating climate policy.

With regard to decisions, this case indicates that some decisions are indeed taking place (deciding to insulate an extra wall), but that those decisions are embedded in the ongoing practice of dwelling. The decisions that are being made and the actions that are being taken may be just as much the result of the existing materiality, competences and meanings as any policies from outside.

**Case 2: When readiness for decision making is created by changes of meanings, materials and competences**

For a number of years up until 2012 a national support program was in place to encourage more Danish homeowners to invest in PV solar panels. Homeowners with solar panels were allowed to “save” the excess electricity they produced in the summer by feeding it into the grid and using a corresponding amount of electricity for free in the winter. They were also given tax benefits relating to depreciation and operational costs (SKAT 2012). The aim of the political initiative was to make PV solar panels more economically advantageous to homeowners. In the case study most of the households mentioned PV solar panels during the interview. Two of 11 the households had been considering them in more detail, but at the time of the interviews only one family had purchased solar panels for their house and were waiting for them to be installed. By using the practice of dwelling perspective, we try to understand the differences in the responses of the

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3 For homeowners ordering PV solar panels after 19 November 2012 new rules apply. The yearly payment changes to hourly. Homeowners now have to use the energy within the hour it is produced and can no longer save it for nighttime or winter. (Anon., 2012. Lov om ændring af lov om fremme af vedvarende energi, lov om elforsyning, lov om afgift af elektricitet og ligningsloven. Denmark: www.retsinformation.dk.)
homeowners to the solar panel policy. Why did only one family decide to acquire PV solar panels while the opportunity for subsidies was the same for all?

All the homeowners interviewed have invested time and money in their houses. All have replaced windows and improved insulation. The reason they give for these actions is that the houses were too difficult or too expensive to keep warm. In this way the materiality of the house did not match their expectations for comfort. Improving the insulation value of walls or windows therefore becomes a natural and meaningful part of their practice of dwelling. Compared with windows, PV solar panels clearly held a different status in the homeowners’ practice. For most of the homeowners interviewed, PV solar panels were something they knew existed as an option, but had not given much thought to. As Jan says, ”Yes, once in a while it pops up. Mostly when for a moment you think about how much money you spend on heating in a year [they have electric heating]. But most of the time, in the summer, we don’t think about it”. This quote represents the perspective of most of the homeowners interviewed in this case. Installing PV solar panels is not as meaningful a part of their practice of dwelling as windows or insulation. It is not something to which they have really been stopped and given more thought. We therefore argue that for this group it is not possible to identify a moment in which a decision is made not to install PV solar panels. No decision has been made in this sense, they are just following their normal practice of dwelling.

We can now look at the family who is installing PV solar panels and try to understand the difference in the process that led to a decision being made. The interview was with Anna. She explains how her husband had been talking about PV solar panels for some time. He thought it was the right thing to do to install them as electricity prices would continue to rise and the only solution was to become self-sufficient, allowing them to control their expenses. Anne continues, “We have friends and relatives who are electricians choosing to install them, because, as they say, it’s the only option”. Anna says that her husband has had a hard job convincing her as she thought they would have to borrow too much money to pay for it. So he took her to several information meetings. He also monitored their electricity consumption down to the hour via their electricity company website in order to find out whether PV solar panels would fit their consumption pattern. In the end they made a decision that PV solar panels would be the right solution for them.

This shows how from the beginning Anna’s husband had another understanding of electricity and electricity production than expressed by the other homeowners in Nakskov. For him, being self-sufficient was a meaningful part of their dwelling practice, as electricity for him was a visible part
of their everyday life, and not, as for most others, something invisible to which they did not give much thought (Shove 2003a, Gram-Hanssen 2010b). This perspective was supported through discussions with friends and family, in which PV solar panels were clearly a debated issue. In this way, PV solar panels were introduced to the whole family as a meaningful part of dwelling. The change in meaning influenced development of new competences. Both Anna and her husband acquired new knowledge and understanding during the process. For Anne electricity went from something for which she just paid the bill to something much more concrete and visible, something she could monitor and create herself. In this way energy production became a natural part of their practice of dwelling.

The point we want to emphasise is that in Anna’s case, the long process of change and new connections between elements of materiality, competences and meanings led to a situation where a decision actually took place. The family decided to purchase PV solar panels, but they could also have decided that this was not a good option for them. All those smaller changes had created a readiness for a decision to be made. For most of the other homeowners, the same chain of change was not initiated with regard to PV solar panels, with the result that they did not achieve a readiness for making a decision. For Anne and her husband, the possibility of receiving subsidies and tax incentives clearly influenced their decision. Anna says that without tax benefits and the system to “save” energy for later, they would probably not have chosen to install the solar panels. But for the remaining homeowners this political incentive did not have an effect, as they never reached a point where a decision could be influenced.

Case 3: When regular decision opportunities do not necessarily translate values into actions

In the last case study, we change focus from one-family houses to a housing cooperative in Copenhagen. In Denmark, especially in the bigger cities, this form of housing is widespread. In Copenhagen 30% of all private houses are part of housing cooperatives. We therefore wish to explore whether and how a practice of dwelling perspective can be useful in situations where not solely one household is responsible for the house they live in but, as in the case of housing cooperatives, where a number of households share the responsibility. In the case of the housing cooperative A/B Park, the executive committee has the responsibility for repairing, maintaining and refurbishing the buildings, delegated by the remaining 500 households. Here, we are looking at
another type of practice of dwelling; rather than a direct practice of dwelling, this could be seen as a delegated practice of dwelling, connected to direct dwelling through the same type of care for the home. There are some clear differences between the practice of dwelling presented in the two first cases and this last one. Firstly, the main activity of the members of the executive committee is not performing maintenance and refurbishment themselves but taking part in meetings and talking to advisers, tradespeople and residents. Secondly, they are not responsible solely for themselves and their own families; their decisions need to be based on the interests of everyone living in A/B Park. This means that in the case of major decisions they not only have to agree among themselves, they also need the issues to be brought up and discussed at the annual general meeting, at which all households in A/B Park are given the opportunity to vote. This means that this delegated practice of dwelling is organised around a number of situations where decision making is in focus. In the previous cases, we argued that often changes do not take place because decision opportunities are never created. The practice of dwelling just continues without the homeowners stopping up to consider new options. In the present case, on the other hand, we are looking at a situation where regular decision opportunities do exist. We therefore discuss what that means for the opportunity of creating changes in meanings, competences and materiality, and thereby transforming this delegated practice of dwelling.

The committee meets every three weeks and the agenda for their meetings are organised by the secretary of A/B Park with input from the committee members. Each meeting normally takes three to four hours, during which time a number of decisions have to be made. When the fieldwork in A/B Park commenced, the newly elected executive committee was very keen to give the housing cooperative a “green” image and they talked about the potential for environmentally desirable solutions. However, during the one-and-a-half year observation period at A/B Park no major project of this kind was realised. Towards the end of the fieldwork, a member of the committee asked at a meeting, “Wasn’t there something about us having a green vision?” A small laugh went around the table and nobody replied. They returned to the agenda and the meeting continued. Returning to practice theories, understanding why values often do not develop into actions, we can try to understand this. Why did this delegated practice of dwelling performed by committee members remain stable, in spite of the voicing of a value about change?

The central aim in this delegated practice of dwelling is to keep A/B Park “running”. The existing practice is marked by the continuous task of maintaining the buildings, carrying out repairs to things
which break down and managing problems presented by the residents. Also, it is clear that the
individual competences of the members of the committee shape the practice of the committee as
whole. Finally, a number of clear meanings exist regarding what the responsibility of the committee
is. A committee member describes what he sees as the responsibility of the committee in relation to
a potential “green vision”, “As the executive committee it is our primary duty to take care of the
interests of the housing cooperative and follow the statutes. This is primarily a financial
responsibility, and as long it is not written in the statutes that we shall have a green focus, then I
don’t think we can (…) make a green focus a requirement, because it will make decisions more
expensive.“

The few times during the field study that environmental issues such as solar panels, reduction of
heat consumption or reuse of rainwater were brought into the discussions, any ideas were rejected
or decisions postponed. This was often because the committee did not have the knowledge needed
to be sure if the environmental solutions would be financially feasible in the long run, and they did
not see that they had the time needed to research the issues in more detail or enter into discussions
that would involve weighing up environmental concerns in relation to their financial
responsibilities.

Again in this case we are unable to identify a decision about not translating the green vision into
practice. Instead, it is clear that for the green vision to become a reality, the committee would need
to achieve new competences and also meaning, as the basic meaning concerning the role of the
committee would have to be challenged. Both processes would take time from and divert the focus
of the committee members. The committee meetings are long and when the last items on the agenda
have been discussed, no more energy is left for further discussions. In this way the vision of a green
image disappeared over time among the many other responsibilities of the committee. No decision
was actively made not to discuss this vision, but more important topics continued to arise, leaving
no room for major discussions on environmental concerns.

In line with Shove, we argue that what keeps A/B Park from pursuing more environmentally
appropriate solutions is not a matter of barriers that can be removed (Shove 2010). Simply stated, if
a barrier for an environmental decision was removed, the committee members might not even
notice, as they are too occupied with their many other responsibilities. This case shows how also in
this delegated practice of dwelling, despite being organised around regular decisions opportunities,
some issues never reach the moment of decision making. This is because the required changes in
meaning, materiality and competences are difficult to achieve in the busy everyday lives of the committee members. The case shows that whether a dwelling practice is performed by a broader collective or an isolated family unit, some of the same challenges for creating changes may occur. When the committee members are elected, they take it upon themselves to perform a practice which has a much longer history than their own involvement. In this way this case demonstrates even more clearly than the two first cases how maintenance, reparation and refurbishment actions cannot be seen as isolated events connected to an isolated decision. Instead they are better understood when seen in association with the existing meanings, materiality and competences and the ways in which they are connected in the continuous ongoing practice of dwelling.

**Influencing refurbishment through the practice of dwelling**

The way refurbishment is practised is constantly changing. Climate policy aims to guide these changes in the right direction. Through our analysis of the practice of dwelling, we may be able to suggest ways that energy and climate policy could work at its best. Our main argument is that aiming all policy at decisions will only influence a small part of homeowners and the changes that are continually taking place in private homes. By changing focus from large refurbishment projects to the practice of dwelling we include a larger part of the investments being made by homeowners. Every time an individual performs an act of refurbishment or home maintenance, it can be done a little differently from last time. We argue that such small changes may serve as a way for policymakers to influence the actions of homeowners.

One example of measures aimed at small changes can be seen in what we may term indirect policy measures. For example, in Norway, ENOVA has done much to increase the energy efficiency of windows through a campaign directed at major window producers, challenging them to increase the energy standard of their products. As a result it is now almost impossible to buy a window in Norway with energy glass that does not fulfil high energy efficiency standards. This means that whenever a homeowner changes windows in their home, the result is an increase in energy performance, even though nothing has actively changed in the practice of the homeowner. The change in this way is introduced indirectly into the practice of dwelling, as via a Trojan horse. The same goes for many other building materials, such as insulation tape, valves and fittings. Some of these products even encourage a change in DIY practices by suggesting alternative ways of building.
to improve energy efficiency. Also, development of products such as tapes and cuffs to make structures more airtight arises out of recognition of the importance of reducing air leakage. The availability of these products in DIY stores in turn makes reduction of air leakage meaningful in the practice of dwelling. The importance of role of DIY stores should therefore be considered in the practice of dwelling, far beyond their role as suppliers of building materials. They provide know-how and promote meaning. Many DIY homeowners also seem to use the shelves of these stores as a thinking tool, as they search for solutions to their construction challenges.

In some cases it is difficult to introduce change into the practice of dwelling through voluntary measures such as subsidies and information. Here, the use of regulations may be effective. A number of studies (Keskitalo et al. Forthcoming, Ryghaug and Sørensen 2009) point to regulation as seeming to be the most effective means of actually bringing about change. It is difficult to apply regulation to refurbishment, but we see examples of it. Both in Norway and Denmark prohibition of oil-fired boilers is on the way. By applying a practice perspective we observe that this regulation seems to reach further than the oil boilers targeted. Prohibition of oil-fired boilers creates an abrupt change in the practice of dwelling as it forces the homeowners who needing to dispose of their oil boiler to act. They simply have to stop and consider the situation; conduct enquiries, calculate prices and make a choice. This opens up a space where new technology can come in. Many homeowners end up investing in advanced heat pump technology to substitute oil boilers. In this way, not only advanced heat pump systems enter the home, but consideration and installation of such technology enter the practice of dwelling. The space opened up in dwelling practice by the planned prohibition of oil boilers is also a space in which policy tools such as information and economic support seem to have an effect. For example, in Norway, ENOVA offers support both for disposal of the oil boiler and installation of more environmentally desirable alternatives.

Finally, when focusing on the know-how of dwelling, it is clear from our case studies that the homeowner appropriates both competences and understanding through their social network and by asking advice from local tradespeople, or through these two sources combined where friends and family are also employed in the building trade. This indicates that education of tradespeople in energy efficiency and climate adaptation is one way to influence practice among homeowners. In

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4 In Norway, all houses with oil-fired boilers are required to change to an more environmentally desirable solution by 2020. In Denmark, after 2013 it will not be possible to install oil boilers in new houses if other options are possible and from 2016 the same rules will apply to all existing houses.
several municipalities in Denmark initiatives have been implemented to offer special training in energy efficiency aimed at local tradespeople (Danish Ministry of Climate et al. 2013a:48, Videncenter for energibesparelser i bygninger 2014). In Norway, ENOVA, Husbanken\(^5\) (The Housing Bank) and Lavenergiprogrammet\(^6\) (“The low energy program”) all work to develop and support education of tradespeople.

To summarise, we argue that the practice of dwelling provides a perspective that makes it possible to be more precise in the evaluation of different policy measures. We also argue that policy measures may be more effective if they aim at the whole practice of dwelling rather than solely decisions regarding refurbishment.

### Conclusion

We have approached refurbishment, not as isolated events in time and space but as part of the ongoing practice of dwelling. An act of refurbishment, we argue, should always be seen in light of this broader practice. We find this perspective especially useful in understanding why homeowners react or do not react to economic and political incentives as expected by policymakers. Through the broader practice of dwelling we are able to achieve a better understanding of why it is difficult to transform practices, but also how changes actually take place and are motivated.

By focusing on practice, we have worked to see beyond the perspective of decision making, which in turn has allowed us to see decision making in a new light. For decisions to be made and changes to take place, there needs to be a readiness for the decision in the practice of dwelling. This readiness may come through gradual changes in material possibilities as well as meanings and the competences of homeowners. Focusing solely on decisions may cause us to neglect the steps which create the readiness to come to a decision that is desirable in the context of a policy to take place, or to fail to see why such steps are absent.

We have, furthermore, paid attention to the role of smaller acts of refurbishment and repair. However, this is not to deny that many improvements to private homes also have the form of large planned and complete refurbishment projects. Our argument is that too much focus on large projects

\(^5\) A public enterprise set up to provide affordable montages, using this to influence building policy

\(^6\) A public program set up to enhance the transition of the building industry towards low-energy building practices
may cause us to miss the opportunity also to influence the many smaller changes continually being performed by homeowners. Changes which both may be important in themselves and which may create readiness for larger decisions.

Focus on all aspects of the practice of dwelling may allow policy actors to influence more elements of the practice they are seeking to change. This, in turn, may contribute to speeding up the process by which private dwellings can be made more resilient and sustainable on an ongoing basis.
Article 3:

**Understanding controversies in urban climate change adaptation**

A case study of the role of homeowners in the process of climate change adaptation in Copenhagen

_Nina Baron and Lars Kjerulf Petersen_

Submitted to Local Environment

**Abstract**

This article explores the controversies that exist in urban climate change adaptation and how these controversies influence the role of homeowners in urban adaptation planning. A concrete “Sustainable Urban Drainages System” (SUDS) project in a housing cooperative in Copenhagen has been used as a case study thereby investigating the multiple understandings of urban climate change adaptation. Several different perspectives are identified with regard to what are and what will become the main climate problems in the urban environment as well as what are considered to be the best responses to these problems. Building on the actor-network inspired theory of “urban green assemblages” we argue that at least three different assemblages can be identified in urban climate change adaptation. Each assemblage frames problems and responses differently, and thereby assigns different types of roles to homeowners. As climate change is a problem of unknown character and outcome in the future, we argue that it can be problematic if one way of framing urban climate change adaptation overrules the others. Some understandings of climate problems and adaptation options may become less influential, even though they could contribute to creating a more resilient city. Furthermore, the case study from Copenhagen also shows that the influence and involvement of homeowners might be reduced if framing of future climate problems becomes too restricted. The result would be that the potential benefits of involving urban citizens in defining and responding to problems related to climate change would be lost.

**Key Words**

Climate change adaptation, homeowners, urban assemblages, controversies, climate adaptation technology, Copenhagen
Introduction

As climate change begins to be seen as inevitable, also in northern countries, climate adaptation is attracting growing attention. The expectation is that the northern part of the world faces a future with higher sea levels, increase in average rainfall and more extreme weather events such as cloudbursts and storm surges. A number of floods and storms in recent years have shown the vulnerability of large cities towards extreme weather events, also in the most developed parts of the world. Climate change adaptation is therefore becoming a high priority issue in larger cities, not least in Copenhagen the capital of Denmark, which delivers the empirical basis for this article.

At the same time, climate change is an “uncertain imminence” (Leyshon and Geoghegan 2012), i.e. a problem of unknown character and outcome in the future. Models exist to predict how climate change might come to affect different parts of the world, but it remains to be seen whether these predictions hold true. As a result, adaptation measures planned or taken today are unavoidably based on estimates and expectations. Response is not to an already known situation but to imaginations of the future, which are multiple, leaving the issue of what climate problems we will face and how best to adapt to them open to controversy.

One of the controversies in urban climate change adaptation is the question of how the responsibility of urban climate adaptation is distributed between different public and private actors. In an urban context, with high population density, all significant adaptation planning will include or at least affect private housing. Damage occurs both to private and public areas, and measures taken may transcend borders between public and private property. Therefore, cooperation between private homeowners and public organizations is often a central part of urban adaptation planning. Furthermore, studies suggest that it may be of benefit in itself if citizens are directly involved in climate change related work or can see the connection between climate change and their everyday life (Macnaghten 2003, Brace and Geoghegan 2011, Baron and Petersen 2014). Involvement makes the climate issue more visible and in turn may make citizens more engaged, both in terms of mitigation and adaptation. Conversely, studies suggest that in cases where full responsibility has been taken by public authorities, engagement on the part of citizens may diminish. For instance, flood risk can gradually disappear from the minds of residents, also where climate change might be expected to increase this risk. Concern among residents about climate change and their interest in taking personal measures diminish, leaving the entire burden of paying for and maintaining adaptation technologies on the public sector (Baron and Petersen 2014). It is therefore relevant to
examine how private homeowners are and can become involved in climate adaptation processes in urban areas.

In this article we analyse and discuss how controversies regarding urban climate change adaptation influence the way homeowners become part of this adaptation process. We investigate the multiple understandings of the technology of “Sustainable Urban Drainages Systems” (SUDS) based on a case study of a concrete SUDS project in a housing cooperative in Copenhagen and the connections of this case to broader adaptation planning at the municipality level. SUDS presents a way in which rainwater can be handled locally. It is the method most often mentioned in relation to possible measures that can be taken by homeowners, and is seen by many as an important contribution to urban climate change adaptation. SUDS is also a technology heavily debated in local administration and among actors working with water supply, sewerage and drainage systems. A case study regarding SUDS therefore allows us to explore the connection between imaginations of future climate change, urban climate adaptation planning, and the role of homeowners in securing their homes and local areas against the effects of climate change.

We start with a short description of SUDS as a technology. Thereafter we present our theoretical framework that centres on the perspective of “urban green assemblages” as a way of understanding the multiplicity in urban climate adaptation planning (Blok 2013, Farías 2010). After a short description of the methods used, the empirical section presents how SUDS has been assigned different meanings in different social contexts; among homeowners in the housing cooperative and among people working professionally with climate change adaptation at the municipal level, respectively. Against this empirical background, three different “urban green assemblages” are identified. The article concludes by arguing how one of these assemblages currently appears to overrule the other two, and thereby has the greatest influence on adaptation planning in Copenhagen and the possibility for homeowners to be involved in this process.

**What is SUDS?**

SUDS is not one technology but the name for a collection of different types of solutions and technologies with the aim of draining or using rainwater locally. The most used and best known SUDS technologies are soakaways, green roofs, rainwater beds and permeable surfaces. All these solutions aim to absorb or evaporate rainwater so it does not end up in the sewage system. The
Danish name for SUDS is LAR, which in most cases is short for “local drainage of rainwater” (Lokal Afledning af Regnvand), but by some people also is understood as short for “local use of rainwater” (Lokal Anvendelse af Regnvand). In the latter understanding, the concept is expanded to look at rainwater also as a resource, e.g. collection of rainwater for use in toilets and washing machines, or to water gardens. The multiplicity encompassed in just the term itself is a useful hint to the many controversies at play in urban climate change adaptation.

**Theory**

Catherine Leyshon (née Brace) and Hilary Geoghegan (2012) argue how climate change is ”an uncertain imminence”, meaning that the issue we are discussing today and seek to adapt to is something which is not predictable. They therefore argue that adaptation plans and technologies can be seen as “anticipatory objects”, as objects which are given meaning on the background of expectations of a future situation. The anticipatory nature of the objects can evidently give rise to controversy, which we clearly identify in the adaptation planning of Copenhagen as a whole, as well as in relation to the technology of SUDS. To explore these controversies, we find it useful to introduce the theoretical perspective of “urban green assemblages”.

**Urban green assemblages**

Anders Blok argues that “urban green assemblages” can be especially useful to understand different perceptions of sustainable city planning and architecture. Blok defines urban green assemblages as “ensembles of heterogeneous actors, humans and non-humans, that orient themselves towards the practical redesign of urban eco-socio-technical relations in the direction of (some sense of) ‘sustainability’” (Blok 2013:19). Blok argues that by analysing how different actors are enrolled and act in different assemblages it is possible to understand the controversies that exist in sustainable urban planning, especially when examined in relation to actual projects.

Blok’s concept of “urban green assemblages” is a further development of Ignacio Farías and Thomas Bender’s (2010) “urban assemblages”. Blok, as well as Farías and Bender build their theoretical understandings mainly on Bruno Latour’s actor-network theory (ANT). A central aspect of the ANT perspective is the conception that both humans and non-humans are involved in socio-material processes and networks, and are therefore relevant to include when analysing social
processes (Callon 1986, Murdoch 2001). Latour (2005) goes so far as to argue that everything, humans as well as non-humans, can and must be seen as actors. He argues that to understand transformations in society we have to look at how these actors continually dis- and reassemble in actor-networks. An urban assemblage perspective, building on the theory of Latour, therefore offers a special sensibility towards the role of non-human actors in urban developments (Mcfarlane 2011a). However, the assemblage concept can also be traced back to Deleuze and Guattari’s concept of “agencement”. “Agencement” is the French word for fitting together or arranging a number of different elements, and Deleuze and Guttari use the word to describe the connections between heterogeneous elements such as things, technologies, human bodies, symbols and so on. By studying these “agencements” or assemblages, it is possible to gain insight into how the world consists of multiple realities (Farías 2010). For Deleuze and Guttari, assemblages are something we can go out and find, and thereby study. This means that they see assemblages as relatively stable structures, at least over shorter time spans. Farías and Bender have introduced this perspective into their urban assemblage perspective, and, as such, the urban assemblage perspective, despite its roots in ANT, differentiates itself from Latour’s ANT. Latour writes about dis- and reassembling of actor-networks, but for Latour actor-networks are not something that ever takes on a stable form. They only come into being in the moment where one actor influences another and are under continual transformation. Moreover, Latour refers to “assembling” as a verb, but in urban assemblage theory the focus is on the noun “assemblage” and thereby something we can identify as taking on a more or less stable form (Farías 2010). This makes it possible to talk about the agency of an assemblage, not only the agency of single actors. When assemblages themselves have agency, we can in turn argue that transformations, developments or perceptions can be the result of certain assemblages (Farías 2011).

**Urban multiplicity**

When Farías and Bender introduced the concept of urban assemblages it was a reaction against the dominant theoretical perspective of “critical urbanism” within urban studies. Their aim was therefore to be able to explain urban development not only as the result of one single dominant and determining force, e.g. the power of capitalism, as critical urbanism seemed to do (Farías 2011). Instead, with the concept of urban assemblages they sought to argue how urbanity consists of numerous urban assemblages existing side by side. This means that several urban “realities” can be
identified within the same urban context (Farías 2011, Hinchliffe 2010). This furthermore implies that the same actors can have many different roles, as each actor can play different roles depending on how they are connected to other actors. Actors’ options are never pre-defined, but depend on how they are enrolled in different assemblages. Within the perspective of urban assemblages, the city as well as the individual actors therefore has to be understood as multiple. The same objects can have different roles depending on how they are connected to other climate change related actors. To understand how the same object is given different meanings in different social contexts, it is useful to trace the assemblage to which the object belongs or becomes part of. In their case study of the plan to expand Barcelona in the 19th century, Eduardo Aibar and W. E. Bijker (1997) show how there were several different ideas about what issues the plan was supposed to solve: hygiene, efficient transportation, protection of privileges, and equality. Understanding of the plan differed according to how it was connected to these different concerns, with the result that arguments that were essential in one frame were perceived as irrelevant in other frames. By tracing the connections and identifying the assemblages, we may therefore be able to obtain a deeper understanding of the controversies in urban climate change adaptation.

**Creating stability and imagining alternatives**

Building on the above, we want to argue that analysis of urban green assemblages is insufficient if it merely establishes the multiplicity and processuality of a given phenomenon. It is also important to identify the actors, elements, constellations and courses that exercise a key role or hold defining and controlling powers in shaping and maintaining a specific material realization and a specific assemblage. Thus, in his study of the development of a new “climate friendly” and sustainable district in Copenhagen, Blok (2013) identifies the multiple elements that are enrolled in shaping the development plan and its realization, but also identifies certain elements that play a key role. A global concern regarding climate change was inscribed in the overall design vision as a principle of carbon neutrality, to be attained through wind turbines in the harbor area surrounding the district as well as photovoltaic panels, geothermal facilities, etc. But as soon as the project moved from plan phase towards materialization the wind turbines were blocked by inhabitants in an adjacent and very affluent municipality with privileged access to relevant policy actors. This shows how different actors and elements do not hold equal power, as some elements can overrule others and even disconnect them from an assemblage. Furthermore, we argue that a strong tool in the assemblage
perspective is that if assemblages are seen as having agency it is possible to analyse how not only elements but some full assemblages have more defining power or influence than other assemblages. This means that some assemblages might define a situation and in so doing push other definitions aside.

A final part of the urban green assemblage perspective relevant to this article relates to imaginations of potential futures. As actors’ connections and options are never pre-defined, there is always potential for change or for a situation to be different. Therefore, studies of assemblages are as much a study of what potentially could be as they are a study of what already is assembled. Every actor could potentially play other roles and be enrolled in other assemblages. This means that by studying assemblages we are able to explore situations where one assemblage might have a defining power and thereby imagine how this could be different.

Methods

The urban green assemblage approach requires empirical exploration in order to unfold the complex and situated connections that exist between the variety of actors involved in different assemblages (Coutard and Guy 2007, McFarlane 2011a). Inspired by ANT’s rule of “follow the actors themselves” (Latour 2005:12, Venturini 2009), we aimed to follow the SUDS plans through the multiple settings in which they are discussed and given meaning in order to acquire insight into how understandings of urban climate change adaptation are constructed in different contexts. This process led the research in various directions, because the connections uncovered from one limited group of actors pointed towards other actors.

In an urban context housing often consists of apartment buildings rather than single-family detached or terraced houses, and in Copenhagen apartment buildings consist mainly of condominiums, rented housing or housing cooperatives representing different forms of occupancy, ownership and legal responsibility. The starting point for the present study was plans for a SUDS project in A/B Park, a housing cooperative of a type common in Nordic countries (Danish: andelsboligforening). Residents share ownership of the building they live in, and decisions regarding building maintenance are made at annual general meetings for all members and, during the year, delegated to an elected executive committee. A/B Park, with its 500 apartments, is quite large for its kind. It was was chosen as a case because its residents were considering a large SUDS
project at the time of the study, making the cooperative an interesting object for exploring how an adaptation project driven by homeowners could turn from idea into reality. That the project never came to fruition does not make the case any less interesting.

The first author of this article followed the executive committee of A/B Park, consisting of nine residents, from the summer of 2012 to the winter of 2014 in its work to launch its SUDS project. She witnessed meetings of the executive committee, attended two annual general meetings, and carried out four individual interviews with members of the executive committee and their advisor. At the meetings, it was possible to follow how the SUDS project was discussed and how it was connected to other elements. The interviews permitted these findings to be pursued, and the perceptions and understandings identified to be explored further. The four committee members interviewed were chosen on the background of observations at the meetings to represent different perspectives both on management and climate change issues. During the fieldwork in the housing cooperative, development of this specific project was revealed to be significantly influenced by changes in the meaning attributed to SUDS at the municipal level. We therefore decided to perform interviews also with actors outside A/B Park, which comprised six interviews from among municipal employees, municipal advisers and employees in the local utility company. All interviews have been transcribed and, together with the field notes from the meetings, have been coded and analysed with focus on descriptions and understandings of SUDS, climate change and the role of homeowners. Finally, we also found it relevant to examine the various political and technical plans and strategies presented in relation to climate change adaptation by Copenhagen City Council in the period from 2009 to 2014 (The City of Copenhagen 2009, The City of Copenhagen 2011, The City of Copenhagen 2012a). With the help of this varied data, we have been able to acquire insights into how climate adaptation planning in Copenhagen is constructed and shaped in different contexts both by human and non-human actors.

The empirical analysis

We cannot present all the data that has been acquired from the different sources, but we will give an account of the patterns that appeared in the data, and will do so by presenting two different paths along which meanings of SUDS have changed and developed. The first path follows the plans for a SUDS project in A/B Park. The second path follows the transforming role of SUDS in Copenhagen
climate change adaptation, at the level of the municipality and the utility company. This path splits into two branches; one focusing on day-to-day rainfall, and one on cloudbursts. Our aim with this section is to illustrate how meanings associated with SUDS have been formed and transformed by its changing connection to a broad range of actors, both human and non-human.

Path 1: A SUDS project that was never implemented

The idea

The person who first had the idea for a SUDS project in A/B Park is Jan. Jan is an architect and specialist in building economy. In 1997 Jan was living in A/B Park, at which time he met Søren. Søren was working in Copenhagen City Council’s energy and environment department. Søren and Jan decided to try to implement a major SUDS project in A/B Park. Jan designed a system to collect rainwater from roofs and use it in toilets and washing machines, and to drain rainwater falling on the ground through soakaways. This would make it possible to disconnect A/B Park’s rainwater system from the public sewage system. Jan and Søren contacted the city council and the utility company for funding, but the utility company refused. The reason given was that they preferred their pipes to be flushed through regularly so they did not need to go down and clean them manually.

In 2011, a new government came to power in Denmark, and initially it wanted to set a green agenda. At this point Jan had moved out of A/B Park, but the public debates leading up to this change in government made him think that there would be a renewed chance of securing financial support for the SUDS project. Around the same time, Lise, a member of A/B Park’s executive committee, ran into Søren, who told her about the old SUDS project and added, “at the moment there is a lot of money in Copenhagen City Council you can apply for, because they have realised that it will cost them even more money to secure the whole thing [the sewage system] against cloudbursts themselves. So if they can get some housing associations or large homeowners to do some of these things, then the council can save money in the long run.” This sparked Lise’s interest in the idea of a SUDS project in A/B Park, and Søren introduced her to Jan. Jan showed her the old plans and posters he had made for the project back in 1997. Together Jan and Lise then presented the project to all of the executive committee. This was in spring 2011. The committee was positive towards the idea from the beginning. As one of the other committee members describes, “economically it makes sense, (...) for as soon as you start to reuse then you save some financial
resources, not to mention the environment (...) you actually do something good for the Earth we live on”. Reuse of water was a central part of the project both for Jan and for the committee. As Jan argues, “from a political point of view, everyone sees the water falling on their heads, but not everyone has necessarily considered that the groundwater reservoirs are polluted and are nearly depleted on Zealand [the island on which Copenhagen is situated and which constitutes the catchment area for the city’s water]”. Lise further comments; “it’s a real shame how we use vast amounts of drinking water to flush toilets and wash our clothes”. However, as A/B Park was in the process of renovating their sewage system at the time when the idea was presented to the committee was presented, they expressed a wish to finish this before taking any decisions related to the SUDS project.

The cloudburst 2011

On 2 July 2011 a cloudburst, now notorious in Denmark, hit Copenhagen. In parts of the city up to 177 mm of rain fell in just a few hours. When the cloudburst was most intense, rainfall was measured as falling at more than 3 mm per minute (Vejen 2011). Large areas of the city became flooded, roads closed for several days, railway tracks were undermined, and the incident resulted in expenses for insurance companies in the region of € 65 million (Forsikring og Pension 2012b) . The rainfall was defined as at least a 100-year event by the Danish Meteorological Institute (Andersen 2011), but was discussed in connection with another cloudburst that hit Copenhagen and the northern part of Zealand just one year earlier, 14 August. Here “only” 90 mm fell, but still numerous basements, restaurants and shops in Copenhagen were flooded and several roads closed (Nielsen 2010).

Many of the basements in A/B Park were flooded in the 2011 cloudburst, but due to the newly renovated sewage system the damage was not as significant as in many surrounding buildings. However, in the autumn of the same year the committee returned to Jan and told him they were interested in his SUDS project. The cloudburst had given the committee members an additional reason for wanting the project and their perspective had broadened: “Copenhagen City Council has a dimensioning problem [regarding the diameter of sewage pipelines] – in general and not only when there is a cloudburst – and therefore our project will mean something. It means something when you make a SUDS project, because then we do not pour water into the sewage system, but
instead we use some of the water”. In this way the SUDS project was seen not only to contribute to climate adaptation of A/B Park itself, but to the overall adaptation of the city as a whole.

**The application is refused**

Jan was asked to make a more detailed project proposal, including a financial plan. The plan was based on extensive subsidies and funding from the municipality and the local utility company responsible for sewerage. The expenses for A/B Park were planned to be a quarter of the total cost. The whole project was then presented at A/B Parks’ general meeting in the spring of 2012, where it was approved by a majority of residents. The committee was granted permission to move forward with the SUDS project, under the condition that it would be in line with the financial plan presented.

Jan submitted the application for funding, but following the cloudburst of 2011 many other home and property owners were also interested in SUDS solutions. This meant that the budget for SUDS projects had already been allocated, and rules for subsidies from the supply company had changed. When A/B Park received a reply to their application they were only granted a quarter of what they had requested. It currently, therefore, seems unlikely that the project will be implemented, since the committee does not see paying the extra expense as an option. Furthermore, as the committee sees the project as benefiting climate adaptation of the Copenhagen as a whole, they do not find it reasonable to bear the majority of the cost.

**Path 2: Administering the climate change adaptation of Copenhagen**

Anders is a biologist by training and works in Copenhagen’s climate adaptation team, charged with planning and coordinating the adaptation work of the city council. Anders participated in introducing SUDS into the work of the council. This progressed very slowly at the beginning, he explains, but then became established with the first climate adaptation plan of Copenhagen, which was published in the summer of 2011. This plan presents possible responses to several different expected effects of climate change: rising sea levels, heat islands, stronger winds and more rain. The major part of the plan is devoted to issues related to flood risk and increase in rainfall. The
A report states that precipitation is expected to rise by 25-50% and the intensity of heavy downpours by 20-50%. Two solutions to handle increased rainfall are then presented. The main solution is to install SUDS technologies. The second solution presented, assigned the revealing name “Plan B”, consists of methods to divert surplus rainwater to somewhere nearby where it will cause no or little damage (The City of Copenhagen 2011). Anders explains how cloudbursts were not really a part of this first adoption work, as they were seen as something which might first be relevant sometime in the future, and it was also difficult to convince people that there was a need for such a big change in the water infrastructure. The plan was finished and sent to political approval by city council officials and technical advisers in June 2011. Shortly after, on 2 July, the heavy cloudburst hit Copenhagen. The cloudburst in 2011 partly changed the direction of climate adaptation planning in Copenhagen. From here on, this path therefore divides into two branches.

**Branch 1: Responding to an increase in day-to-day rainfall**

Signe is an architect and Diana a landscape architect. They are both employed at the Centre of Urban Design in Copenhagen City Council. Signe works with private apartment buildings and Diana with redesign of urban courtyards. They tell how they incorporate in their work an aim of disconnecting at least 30% of the rainwater from private courtyards and roofs in Copenhagen from the public sewage system. This is by no means a regulatory standard to which they have to comply but a guideline they “really, really want to follow”. Disconnecting 30% of stormwater by means of SUDS solutions is here seen as the way the city can handle the expected increase in rainwater. At the Centre of Urban Design, every time they fund a project or receive an application for changes in courtyards or buildings, they consider the options for integrating SUDS solutions. It is not always possible to install SUDS, however, as buildings and neighbourhoods differ. Diana explains, “it’s alright to say that we should disconnect at least 30% of all rainwater, (...) but if the block is very narrow it is difficult to reach the 30% with the normal solutions we have today, also because in our projects there is a relatively modest amount of money to use for this”.

A neighbourhood in Copenhagen called Sankt Kjelds has been selected by Copenhagen City Council as a special innovative climate neighbourhood. In Sankt Kjelds they aim to disconnect more than 30% of stormwater, as they have a larger budget for climate solutions. A special aim in the in the Sankt Kjelds project is to involve the local citizens as much as possible in both creating and implementing the climate solutions. SUDS, in Sankt Kjelds and in the city as a whole, is seen as a
solution to increased precipitation and the potential is seen to be best exploited in cooperation with homeowners and citizens.

**Branch 2: Responding to higher frequency of cloudbursts**

After having approved the first climate adaptation plan in August 2011, in response to the cloudburst a month earlier the politicians of Copenhagen requested more preparatory planning; this time with special focus on cloudbursts. This led to the Cloudburst Management Plan, which was concluded in October 2012. This plan presents a radically different perspective on the role of SUDS. The cloudburst plan argues that the severe downpour experienced in 2011 together with newer calculations show that the methods suggested in the first Climate Adaptation Plan from 2011 were not sufficient to handle this kind of extreme rainfall. Even by using the “Plan B” approach, only a minor part of the requirement for rainwater drainage in the case of cloudbursts was addressed (The City of Copenhagen 2012a). The Cloudburst Management Plan therefore suggests that stormwater instead must mainly be led out onto the streets and transported by various routes to the sea. Anders argues, "you can say that the cloudburst meant that cloudburst planning overtook SUDS and the day-to-day rainfall". Now, all energies were directed to working with the cloudburst plan, and work with SUDS was pushed to one side. At the moment of writing, Copenhagen’s climate adaptation team, together with the local utility company HOFOR, is in the process of turning the Cloudburst Management Plan into concrete climate adaptation projects all over the city; e.g., making cloudburst roads to transport the water or creating large retention areas, for instance lowering the water level in one of Copenhagen’s central lakes. Implementation of the Cloudburst Management Plan was once again made topical by yet another “100-year incident”, when a cloudburst of almost the same severity as the one in 2011 hit Copenhagen in the early hours of 31 August 2014, pouring up to 134 mm of rain over the city and not least over the aforementioned Sankt Kjelds district.

HOFOR still receives many applications from homeowners who would like to implement SUDS projects. Peter works in HOFOR and is an engineer by training.

He talks about one of these applications:

Now this housing association begins talking about installing SUDS and they know that the stormwater they get is something which is streaming downhill from a lot of other places. Why do they have to install SUDS? Shouldn’t they just wait for that public cloudburst solution to come? Then they will get a watercourse on each side they can pour their water into. They want to do
something, because they are standing in water up to their knees, I understand that, but they just can’t do anything that helps. It has to be done further away and on a larger scale.

Peter sees this individual project in the context of the cloudburst plan. In this particular case, he does not think it makes sense to implement a SUDS project, as the residents’ problem would be better solved by the forthcoming public solutions. Also, from a more financial perspective he does not think that SUDS makes sense everywhere: “There is no reason for taking the most expensive square metres if it helps just as much to disconnect a lot of gardens up in Vanløse [a suburban area a little outside central Copenhagen]”. Therefore, HOFOR’s strategy is that, ”when people contact us, we try to look at the (cloudburst) plans (…). If a project makes sense in relation to the plans, they might as well implement it”. HOFOR therefore only sees SUDS solutions as relevant in carefully chosen areas upstream of central Copenhagen.

The controversies

It is interesting to note how the cloudburst in 2011 led to a decreased interest in SUDS solutions in parts of the city council as well as the utility company, while applications for funding clearly show that among home and property owners the cloudburst had the opposite effect. Also, AB Park’s concern with not only removing rainwater but also collecting it for use indicates another understanding of SUDS than the ones presented in the municipal plans. Finally, there is disagreement between the residents of AB Park and the public administration with regard to funding. The former find it reasonable that public actors pay the larger part of their SUDS project, and the latter find it reasonable only to pay a smaller part. To achieve a deeper understanding of these controversies and how they are connected to broader controversies in urban climate change adaptation, we now present three assemblages that we have identified on the background of our empirical data.

Assemblages creating different SUDS realities

Independent solutions to handle rainfall on private sites

Copenhagen is expected to receive more rain in the future and it is possible to identify an assemblage relating to this issue. Here, the main problem is to solve the 30 % increase in
precipitation and the solution is to take care of the rainfall very locally. This is the understanding that lies behind the first climate adaption plan published by Copenhagen City Council, in which SUDS is seen as the main solution. It is also this perspective that shapes the aim to disconnect 30% of rainwater from sewerage in as many places as possible, as Signe and Diana at the city council’s Centre of Urban Design seek to practise. In this sense, all parts of the city are looked at independently in relation to how they will be able to drain or in other ways handle the extra rainfall they will receive. Each private site would play a role in handling its own rainwater. Key elements in this assemblage include climate change scenarios predicting higher average rainfall, home and property owners throughout Copenhagen, certain municipal departments, the existing sewerage infrastructure, and various techniques to retain rainwater locally. This assemblage is partly maintained by the committee of AB Park, and especially by the Centre of Urban Design. Both private households and public institutions are perceived to have a central role to play; private home and property owners having to handle the rainfall on private sites, and public professionals on public areas.

Collective and connected solution to rain handling

Another assemblage is oriented towards the issue of collective and connected stormwater solutions. Especially the utility company HOFOR and the climate adaptation team in the Copenhagen city council are key actors in shaping this assemblage. Here, the main focus is on extreme rainfall events and how to reduce the damage they cause. In contrast to the aforementioned assemblage, private sites, public streets, parks and squares are not seen as independent entities; the entire city is looked at as a connected system. This also means that SUDS technologies relate to rainfall not only on the ground where it falls but to rainfall in the city and the surrounding area as a whole as well as the resulting movement of water on (and in) the ground. Key actors in this assemblage include the Cloudburst Management Plan, the municipal climate adaptation team and the utility company. The perspective they share is not only based on climate models but also on experience, making the 2011 cloudburst in Copenhagen another central actor in developing this assemblage. Here, protection against heavy downpours takes on higher priority than adaptation to increased day-to-day rainfall. SUDS may also have a role in this assemblage, but only if it is seen to support the larger plan. In general, SUDS is perceived as a more or less irrelevant solution in this perspective, as it is not seen as being able to drain the water quickly enough when it comes in the form of cloudbursts.
**Treating rainwater as a valuable resource**

The third assemblage challenges the understanding of SUDS as relating only to local drainage of rainwater and instead advances the perspective of rainwater as a resource to be collected and used, not simply diverted. This assemblage is central to the understanding of the SUDS project in A/B Park. This assemblage stretches far beyond the city. Here, it is not only the rainwater falling in the city that is enrolled, but fresh, clean and non-polluted drinking water for the whole of Denmark and even further afield. The broader adaptation planning of the city is not part of this assemblage, instead all rainwater is perceived as worth collecting. Concern about the need to protect natural resources is in focus. Here, climate change is not only connected to increases in precipitation but also to longer periods of dry weather and pollution of aquifers by agricultural use of pesticides, which together increase the risk for water shortages. SUDS is therefore not only a solution to increased rainfall but also to longer dry periods and other threats to the freshwater resource.

**How different assemblages create different roles for private homeowners**

It is of interest now to return to the role of homeowners and look at how it differs in the three assemblages.

In the first assemblage both everyday day-to-day rainfall and cloudbursts are included, but the solution is seen to be a large number of independent SUDS projects. This means that homeowners are given an important role to play. As SUDS presents a way in which to handle the extra 30% of rainfall, it is seen as meaningful to install SUDS as widely as possible. Homeowners have an interest in investing in this kind of technical solution as it represents a way of securing their homes against a future with more rain. Also the public actors, the city council and the utility company have an interest in having as many homeowners as possible install SUDS, because this can reduce pressure on the public sewage system as well as the general risk of flooding.

In the second assemblage the issue of day-to-day rainfall has disappeared and the actors instead orient themselves towards cloudburst challenges in the city as a whole. This changes the role of homeowners greatly. SUDS solutions are here seen in the context of the entire existing sewage system and the extensive cloudburst plan under implementation. It means that the individual SUDS project is only relevant if it fills a hole in the public planning. In cases where a residence will get “a
watercourse on each side that they can pour their water into”, SUDS projects make no sense. In this way, the actions of the homeowners follow the actions of the public water managers. The homeowners’ options for action are defined by public plans and strategies, and directly shaped by taxation and funding schemes. The overall plan has to be completed before it is possible to say where it gives any meaning to involve private households. In most cases, collective systems are seen as the most efficient and simplest way of adapting the city to a future with more rainfall and cloudbursts. Therefore, homeowners play only a minor role, if they have one at all.

In the final assemblage the group of concerns and elements has become even larger and includes drought and quality of drinking water. Homeowners are again a central player, but not just in protecting their own property and its immediate vicinity but in safeguarding water resources at a national level. As all rainwater is seen as a resource, it gives meaning to collect as much as possible. In this perspective the more homeowners who install SUDS solutions to use rainwater the better. Aiming at self-sufficiency becomes meaningful in itself, even though it might not be the most efficient way to protect against flooding.

The analysis above shows how the three different assemblages enroll different ways of imagining future climate change. In the first assemblage, ideas of what kind of problems the future will present are very much based on climate models predicting a 30% increase in precipitation. The second assemblage also builds on climate models, but in a sense even more on concrete experiences of extreme weather. In this assemblage the cloudbursts in Copenhagen have a very significant role in defining the actions of other actors in the assemblage. The experience of how much damage an extreme rain event can cause shapes cloudbursts as an imminence which already feels very real. Finally, the last assemblage is both shaped by and creates another way of imagining the future that is not only concerned with stormwater but resource scarcity in general. The above shows how both space and time are enrolled in different ways into the three assemblages (Farías 2010), and how this creates different imaginations of the future (McFarlane 2011a).

**Powerful actors and locked assemblages**

Climate change adaptation planning in Copenhagen involves a variety of actors assembled in various ways. The different assemblages have different roles for the actors involved: a defining role, a reacting role or no role at all. The cloudburst of 2011 had the power to instigate a reassembly of
actors in climate change adaptation. The event made the urgency to protect the city against cloudbursts a priority, such that a political decision made after July 2011 overruled work already going on in various sections of the city administration and among homeowners. As Anders from the Climate Adaptation Team comments, for some time now cloudburst planning has pushed most work with SUDS to one side. At the time of writing, it looks as if collective and connected solutions will constitute the main approach, and these will be placed mainly on public areas. SUDS solutions on private areas will only be considered in connection with redesign of large courtyards financed by the city council. Diana from Centre of Urban Design tells that at most there are twelve of these projects per year. This shows how reassembly after the cloudburst in 2011 to a large extent came to be defined by key actors such as officials in the utility company and the Climate Adaptation Team. The defining powers of these actors rest in their control over funding and taxation schemes as well as their responsibility for writing the adaptation plans for the city as a whole. These powerful actors have managed to lock the assemblage around collective and connected discharge management technologies to an extent where actors they find irrelevant are excluded. Furthermore, this assemblage as a whole has been shown to have the power to reduce the influence of other assemblages.

In the currently dominant assemblage, collective and connected rainwater solutions are perceived to be “the best solutions” as they are seen as the only way the cloudburst issue can be met. However, severe rainfall events are only one of many different possible impacts of climate change. In the remaining assemblages, other future issues are included, such as water shortages, pollution of drinking water and more day-to-day rain. This illustrates that it is possible to imagine other climate futures for Copenhagen. In these other framings of climate change, other adaptation measures come to be seen as “the best solutions”. Whereas the cloudburst in 2011 is used as an argument for the direction in which Copenhagen adaptation planning is heading at the moment, different lessons are drawn from this incident in the other assemblages. In the assemblages supporting independent solutions the cloudburst is used as an argument for the public system not being able to face the challenges alone, and that every small project therefore can make a difference.

Based on this assemblage analysis, we find it relevant to question whether large collective rainwater systems always present the “best solution”. As all three assemblages orient themselves towards future problems, the extent and type of which are not currently known, it might be conceived as problematic if one assemblage steers the whole adaptation process without paying much attention to
problems seen as central in other assemblages activating other actors. Even though cloudbursts might present the largest and most challenging problem at present, nobody knows if water shortages will turn into a more serious problem, as already is the case in many other big cities. In the same way, nobody knows if the future will bring unforeseen problems in connection with more day-to-day rainfall. If one assemblage gains so much power that other assemblages lose any influence, the resilience of the city may be compromised. The political focus on extreme rainfall events, created after July 2011, may mean that developments now move so fast in the direction of cloudburst management that some other issues in climate adaptation are lost in the broader planning process.

Finally, we return to the role of private homeowners. The ability of one assemblage and its key actors to define the present course of development and reduce the influence of other assemblages might not only mean that other potential climate-related problems are overlooked; this study also reveals that homeowners can become marginalized in climate adaptation planning. In the present dominant assemblage, homeowners are rendered marginal in the broader adaptation planning. In the two remaining assemblages, homeowners on the other hand are assigned an active role defining problems and solutions. As mentioned in the introduction, several studies indicate that it can be beneficial if citizens are given an active and influential role in the preparation of climate change plans and projects (Macnaghten 2003, Brace and Geoghegan 2011, Baron and Petersen 2014). In this way they are more likely to develop ownership of the projects as well as a general concern and interest in climate issues. Furthermore, other studies argue how lay knowledge can provide a useful contributions to expert knowledge, as lay people often have a closer connection to, and thereby more detailed understanding of, e.g. high water lines and special local challenges, that could prove useful for the planners of climate change adaptation (Karvonen 2011, Agger 2010, Ingold 2000). Last but not least, the case study of A/B Park demonstrates that by excluding homeowners from being part of defining problems and solutions, concrete resources might also be lost. The executive committee of A/B Park was very interested in the SUDS projects and found it so relevant that even though they were not willing to pay the full price they were nonetheless planning to allocate significant funds to the project, not to mention their energy and time. By not involving private homeowners, there is the risk that the potential represented in this kind of public engagement and resources relating to climate issues are left unexploited.
Conclusion

This article reveals how several assemblages can be identified in urban climate change adaptation. This means that multiple understandings of future climate issues and how to respond to these exist side by side. We have further shown that multiple understandings of the role of homeowners exist in this urban context. Some assemblages construct a reality where homeowners play an important role; others establish the public system as being able to solve the problems more efficiently. The article, moreover, argues that when analysing urban green assemblages it is insufficient only to assert the processuality and multiplicity of these assemblages; it is important also to identify the actors that achieve defining and controlling powers and the ways in which assemblages are locked in particular formations (however temporarily). Following this approach, we identify a defining event represented by a specific cloudburst and two official bodies controlling taxation and funding schemes as key actors in shaping a dominant stormwater handling assemblage. From this realization we argue in favour of not letting one construct of problems and solutions in relation to climate change adaptation overrule the others, as the present multiplicity of urban green assemblages has the potential to create a more resilient city with the capacity to respond to a broader scope of climate change and environmental issues. Furthermore, we argue that domination of one assemblage over the others in the process of climate change adaptation in Copenhagen represents a move towards reducing the role of private homeowners, and the potential benefits of involving urban citizens in defining and responding to problems related to climate change are lost. On the background of the present assemblage analysis we therefore advocate allowing multiple imaginations of future climate change to exist and be included in present urban climate adaptation planning.
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**Appendix: Interview guides**

**Spørgeguide til boligejere i Nakskov**

**Baggrundsinfo**
- Hvem de bor sammen med
- Alder
- Beskæftigelse

**Boliglivshistorie**
- Hvornår flyttede du/I ind
- Hvorfor flyttede i ind her?
- Hvorfor netop dette hus
  - Hvad var det gode ved huset
  - Hvad var det mindre gode
  - Var der noget I fra starten gerne ville ændre.
- Hvad var det første du/gjorde ved huset/haven
  - Hvorfor?
- Hvad var det næste osv.

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- Har I nogen planer om at lave ændringer ved jeres hus i fremtiden
  - Hvilke og hvorfor?
- Hvad drømmer I om at kunne gøre ved jeres hus, hvis penge ikke skulle begrænse?

**Opsamling**
- Hvilken forandring som du har lavet er du gladest for/har betydet mest for dig?
  - Hvorfor?
  - Hvad var den vigtigste grund til at du valgte at lave denne forandring?
- Hvad er du mest bekymret over i forhold til dit hus?
- Jeg vil som sagt gerne se på hvordan husejere tilpasser deres huse til lokale forhold. Tænker du at nogen af de forandringer du har lavet skyldes at du bor netop her hvor du bor?

**Erfaring med oversvømmelser**
- Jeg ved at I flere gange har oplevet oversvømmelser her i Nakskov. Har du boet her i byen mens det er sket?
  - Hvordan oplevede du det?
- Har det ført til at du har ændret/gerne vil ændre noget ved dit hus?
- Betaler du til en et digelag/pumpestation?

**Betydningen af klimaforandringer for interviewpersoner**
En af de ting de taler meget om her i Lolland kommune er tilpasning til klimaforandringer.
- Tror du at klimaforandringer er noget I kommer til at opleve her i Nakskov?
- Tror du klimaforandringerne får nogen betydning for din dagligdag?
  o For dig selv
  o For din familie
  o For dit lokalområde
  o For dit hus

Energi

Der er for tiden et stort politisk fokus på klima og energi.
- Som husejere er det noget der har påvirket dig?
- Der er gjort forskellige forsøg på at påvirke jer husejere til at spare energi og varme, eller til selv at producere energi på forskellige måder – blandt andet ved at give forskellige tilskud.
  o Har du hørt om nogen af dem?
  o Hvis du har – har det betydet noget for hvad du har valgt at gøre/gerne vil gøre ved dit hus?
  o Har du oplevet at lokalplaner eller forskellige typer reguleringer har gjort det sværere eller måske umuligt at ændre ved dit hus som du vil?

Sammenhængen mellem energi og klima
- Alt den her snak om klimaforandringer, især her på Lolland, får det dig til at tænke over den måde du selv bruger energi på?

Afsluttende – et godt hjem
- Hvad er et godt hjem for dig?
  o Hvad skal det gode hjem kunne?
  o Hvordan skal det gode hjem få dig til at føle?
Spørgeguide til boligejere i Onsevig

Baggrundsinfo
- Hvem de bor sammen med
- Alder
- Beskæftigelse

Boliglivshistorie
- Hvornår flyttede du/I ind
- Hvorfor flyttede i ind her?
- Hvorfor netop dette hus
  - Hvad var det gode ved huset
  - Hvad var det mindre gode
  - Var der noget I fra starten gerne ville ændre.
- Hvad var det første du/gjorde ved huset/haven
  - Hvorfor?
- Hvad var det næste osv.

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- Har I nogen planer om at lave ændringer ved jeres hus i fremtiden
  - Hvilke og hvorfor?
- Hvad drømmer I om at kunne gøre ved jeres hus, hvis penge ikke skulle begrænse?

Opsamling
- Hvis vi skal samle lidt op, kan du så nævne de tre ting du er gladest for her i og omkring dit hjem?
- Og kan de nævne tre ting du gerne ville lave om på?
- Hvad er du mest bekymret over i forhold til dit hus?
- Jeg vil som sagt gerne se på hvordan husejere tilpasser deres huse til lokale forhold. Tænker du at nogen af de forandringer du har lavet skyldes at du bor netop her hvor du bor?

Erfaring med oversvømmelser
- Boede du her da Onsevig blev oversvømmet i 2006?
- Hvis ja - Hvordan oplevede du det?
  - Kan du huske hvor du var da du fandt ud af at der skete noget udsædvanlig?
  - Hvad skete der så?
  - Hvad tænkte du bagefter?

Betydningen af klimaforandringer for interviewpersoner
En af de ting de taler meget om her i Lolland kommune er tilpasning til klimaforandringer.
- Tror du at klimaforandringer får betydning for jer i Onsevig?
- Tror du klimaforandringerne får nogen betydning for din dagligdag?
For dig selv
For din familie
For dit lokalområde
For dit hus

Energi
Der er for tiden et stort politisk fokus på klima og energi.
  - Som husejere er det noget der har påvirket dig?
  - Der er gjort forskellige forsøg på at påvirke jer husejere til at spare energi og varme, eller til selv at producere energi på forskellige måder – blandt andet ved at give forskellige tilskud eller give en masse information.
    - Er det noget der har betydet noget for de ting du har gjort ved dit hus?
    - Har du oplevet at lokalplaner eller forskellige andre typer offentlige reguleringer har gjort det sværere eller måske umuligt at ændre ved dit hus som du vil?

Sammenhængen mellem energi og klima
  - Alt den her snak om klimaforandringer og alle de projekter her i Onsevig har det fået dig til at tænke over den måde du selv bruger energi på?
Spørgeguide til bestyrelse i A/B Park

Baggrundsinfo
- Størrelse lejlighed
- Hvem de bor sammen med
- Alder
- Beskæftigelse
- Hvor længe har du boet i andelsforeningen
- Hvor længe har du siddet i foreningens bestyrelse

Boliglivshistorie
- Hvornår flyttede du/I ind
- Hvorfor flyttede I ind her?
- Hvorfor netop her?
  - Hvad var godt ved denne andelsforening?
  - Hvad var mindre godt
- Hvorfor netop denne lejlighed?
  - Var der noget I fra starten gerne ville ændre ved lejligheden?
- Hvad var det første du/I gjorde ved lejligheden
  - Hvorfor?

Billeder
Jeg har på forhånd bedt om at interviewpersonen tager ca. tre billeder af hvad det bedste ved at bo her er og ca. tre ting som han/hun gerne vil ændre.
- Hvorfor har du valgt netop disse tre billeder for hvad der er godt ved at bo her?
  - Lejlighed/forening/lokalområde
- Hvorfor er det netop disse tre ting du gerne vil lave om på?
  - Hvorfor er det mindre godt?
  - Vil det være muligt for dig at lave om på de ting?
  - Hvad skulle der til for at lave disse ændringer?

Som bestyrelsesmedlem
- Hvorfor valgte du at stille op til bestyrelsen?
- Havde du nogen konkrete ting du gerne ville ændre hvis du blev valgt til bestyrelsen?
- Føler du at du har haft indflydelse på hvad der nu besluttes i bestyrelsen?
- Hvis der blev indført enevælde i bestyrelsen i morgen og du var den der skulle bestemme alt, hvad var så det første du ville gøre eller ændre?
- Hvad syntes du er den største udfordring ved at sidde i bestyrelsen som den er nu?

Erfaring med oversvømmelser
- Boede du i foreningen sidste sommer da vi fik det store skybrud?
- Hvordan oplevede du det?
- Gik det ud over nogen af dine ting?
- Har du gjort noget for at det ikke skulle ske igen?
- Har foreningen gjort noget for at det ikke kunne ske igen?

Betydningen af klimaforandringer for interviewpersoner
- Der tales meget om klimaforandringer og behovet for at tilpasse sig nye forhold. Er det noget du har tænkt over?
- Tror du at klimaforandringer er noget I kommer til at kunne mærke her hvor I bor?
- Tror du klimaforandringerne får nogen betydning for din dagligdag?
  - For dig selv
  - For din familie
  - For din lejlighed/andelsforeningen?
  - For København

Energi
Der er for tiden et stort politisk fokus på klima og energi.
- Er det noget du tænker over i din hverdag?
- Er det noget I har talt om i andelsforeningen?

- København har generelt et stort fokus på energi og klima, blandt andet med deres plan om at blive verdens første CO2 neutrale storby. Har dette politiske fokus haft nogen betydning for jeres beslutninger privat og her i foreningen?
  - I forhold til information
  - I forhold til forskellige tilskudsordninger?
  - I forhold til ny lovgivning og nye reguleringer?
    - Er der noget af den nye klimalovgivning der har givet problemer for jer her i foreningen?

Sammenhængen mellem energi og klima
- Dette store fokus på klimaforandringer, får det dig til at tænke over den måde du selv bruger energi på?

Afsluttende – et godt hjem
- Hvad er et godt hjem for dig?
  - Hvad skal det gode hjem kunne?
  - Hvordan skal det gode hjem få dig til at føle?