The nature of decision making in the practice of dwelling

A practice theoretical approach to understanding maintenance and retrofitting of homes in the context of climate change

Håkon Fyhn PhD. Post doc at Department of Interdisciplinary Studies of Culture, Norwegian University of Science and Technology. E-mail: hakon.fyhn@ntnu.no

Nina Baron PhD. Department of Environmental Science, Aarhus University.

E-mail: niba@phmetropl.dk

Introduction

In the context of climate change, the question of how homeowners retrofit and keep their homes in repair is receiving increased attention from policymakers, pro-environmental NGOs and city planners in Scandinavia. The ambition of these actors is to influence homeowners to retrofit in such a way that their homes will use less energy. Efficient policy requires policymakers to have an appropriate understanding of the situation that the policy aims to change. This makes questions of what is going on when people retrofit and maintain their homes and why they do what they do, highly relevant. In the formulation and implementation of energy-related building policy, we see a tendency to focus on the *decisions* that homeowners make with regard to retrofitting. Information campaigns and subsidies tend to be aimed at homeowners who are about to make decisions regarding retrofitting. The expectation is that when homeowners are weighing options, information and subsidies may influence their decisions in favour of more sustainable solutions. While acknowledging that certain decisions may be influenced by such policy tools, we argue for the need to take one step back and look beyond the scope of the isolated moment when a decision is made. Rather, we should focus on the whole process leading to – or away from – acts of retrofitting and maintenance. Such a focus implies a shift away from decision making to the practice of keeping a house habitable.

Practice theoretical perspectives have traditionally focused on everyday practices such as driving, showering and cooking, but attention is increasingly turning to retrofitting (Bartiaux et al. 2014; Vlasova and Gram-Hanssen 2014; Judson and Maller 2014). A main point in practice-orientated retrofitting studies is that alternative approaches to the dominant focus on economical calculated choices are more empirically accurate and should be theoretical explored (Maller and Horne 2011;

Maller et al. 2012; Wilson et al. 2013). In the present article, we seek to contribute to this aim, building on central contributions from earlier studies that: argue that consideration of everyday practices should be incorporated into the energy retrofitting process and is central for understanding the effect of energy retrofitting (Vlasova and Gram-Hanssen 2014; Judson and Maller 2014); discuss whether it is possible to identify a specific energy retrofitting practice (Bartiaux et al. 2014); and argue for the need to understand retrofitting not only as something that takes place in one go (Fawcett 2013), but also as an ongoing process of turning a house into a home (Dowling and Mee 2007).

We add to this development by combining the idea of retrofitting as an ongoing process with Tim Ingold's (2000) phenomenological perspective on 'dwelling'. Ingold argues that dwelling is a process wherein one continuously performs smaller or larger alterations to one's property (e.g. replacing a broken window, repairing a leaking tap or adding extra space when one's family grows). Against this background, we argue that the constant transformation of our homes to match our changing needs and life situations are part of the practice of dwelling, though not all of it.

We start with a discussion of the use and limitations of a narrow focus on decisions, then suggesting the practice of dwelling as an alternative approach to examining the actions of homeowners. On the basis of two case studies – one from Denmark and one from Norway – we argue: (1) that decision making is best understood as a process embedded in the ongoing practice of dwelling; and (2) that 'readiness' for decision making is a result of many smaller transformations of meaning, materials or competence, which may or may not lead to a moment in which a decision is made.

Political Interest in Decision Making

In strategies and plans related to climate policies we see a certain focus on decision making. In a strategic document for the energy retrofitting of private housing, Copenhagen Municipality writes: 'The municipality's best chance for creating a reduction in the CO^2 emission is to influence the relevant decision makers'(Copenhagen Municipality 2009, p. 69). Homeowners are also referred to as *'*decision-makers' in a strategic document at the foundation for the policy of ENOVA, a Norwegian public enterprise set up to promote the transition to more sustainable energy use. ENOVA writes: '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, p. 67).

Focus on decisions and decision makers is not the only approach engaged in by policymakers aiming at homes, but it seems to play a dominating role in all levels of policy centred on economic analysis. It corresponds with an understanding of behaviour as the product of well-thought-through decisions (Ajzen 1985), even though ENOVAs strategic report also states that decisions are not always carefully considered (p. 67). Decision making is typically seen as an isolated event in which all possible options are weighed and the best 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 more beneficial than alternatives. That perspective has faced growing criticism and many of its basic assumptions have been challenged (Loewenstein 2001; Shove 2003). Several studies demonstrate 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 in experimental

settings) further indicate that most decisions are not reached by weighing options against each other side by side, but rather by evaluating options in sequence until a satisfactory one is found (Orasanu and Connolly 1993; Simon 1976). Thus, decision making is a holistic process rather than an isolated event, often spread over a long time span and consisting of many phases.

We do not challenge the idea that decision making plays a role in home retrofitting and maintenance, even an important one. However, we do argue that decision making cannot explain everything that is going on, or – even more importantly – that is *not* going on in practices related to the retrofitting and maintenance of private homes. In so doing, we shift focus from seeing actions made by homeowners as a result of decision events to seeing decisions and actions as embedded in a practice of dwelling.

Dwelling as an Ongoing Process

Policy aiming to influence the energy standard of private homes tends to focus on two moments in the history of the house: first, the time at which it is built; second, the time at which it changes owners. At these times, it is expected that decisions are made to shape the quality of the home (Danish Ministry of Climate, Energy & Building 2013b, p. 38). This view fits what Tim Ingold (2013) calls a 'building perspective'. Ingold argues that the building perspective is dominant among architects and engineers, who see a home as something that is first built and only later a finished product that houses people. Ingold is critical to this perspective and suggests, as an alternative, a perspective in which there is no clear distinction between a building and a dwelling. In most cases, Ingold argues, a home continues to evolve as people live in it, 'keeping it under repair, decorating, or

making structural alterations in response to their changing domestic circumstances' (Ingold 2000, p. 187). Ingold calls this a 'dwelling perspective'.

Several studies support Ingold's argument by pointing out that the ongoing process of transforming a property is central to making it – and keeping it – a home (Dowling and Mee 2007; Petersen 2008; Skov 2010). Life changes: people living in a house have children; as the children grow older they demand more space and new solutions; after a while the children move out. Not only do the lives of the dwellers change, but also technologies and local infrastructures. In addition, houses must be maintained. Things such as roofs, planking and windows break down or wear out and must be repaired. Dwelling is an ongoing task that continually demands work being carried out. A house in which nobody dwells will fall into decay.

Maintenance and repair are absolutely central in the flow of everyday life, but are often forgotten or overlooked activities (Graham and Thrift 2007). A survey among Danish homeowners shows that 70 per cent see maintenance as a continuous process of small reparations (Gallup 2012), indicating that a large amount of work on homes is conducted outside of major retrofitting projects. Against this background, we argue that if policy measures aim only at influencing homeowners engaging in major retrofitting projects or moving into a new house, a large portion of the money and energy homeowners put into their homes is overlooked. Against this background we suggest looking at the broad practice of dwelling in order to understand homeowners' retrofitting and maintenance actions.

The Practice of Dwelling as an Analytical 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, p. 1). One trait they share is that they each pose alternatives to behavioural theories focusing on decisions, showing that many of the actions we perform in our everyday lives are not the result of carefully considered decisions or values, but are habits or embodied knowledge within techno-social systems (Halkier and Jensen 2011; Hand, Shove, and Southerton 2005).

Elizabeth Shove, Mika Pantzar and Matt Watson (2012) define 'practice' as consisting of three elements: meaning, materials and competence. 'Competence' is defined as an understanding and practical ability; 'meaning' as 'the social and symbolic significance of participation at any one moment'; and the 'material' element encompasses objects, infrastructure, tools, hardware and the body itself (Shove et al. 2012, p. 23). A practice typically needs to be performed regularly in order to exist and recruit new carriers (Gram-Hanssen 2010; Shove 2003; Warde 2005). However, recent research has successfully applied a practice perspective to understand less frequent and routinized activities such as retrofitting a home (Bartiaux et al. 2014; Vlasova and Gram-Hanssen 2014; Judson and Maller 2014). The main argument in these studies is that, even in activities not performed every day, it is possible to identify specific connections between meaning, competence and materials that reach outside the individual performing the actions. Also, retrofitting and maintenance can be connected to broader social conventions and material conditions.

Explaining Stability and Change

In the practice studies referred to above there is common interest in the connection between environmental values and energy-saving actions. The studies indicate how practice theory can help us understand why values often do not translate into action. A main point is that, in most cases, our energy consumption is part of everyday practices upon which we do not reflect; also, energy consumption is so deeply entwined in socio-technical systems that it is very difficult for us to change our energy consuming activity (Gram-Hanssen 2011; Hand et al. 2005; Holden and Linnerud 2010; Shove 2003). In this sense, practice theory is a strong tool for explaining the stability of practice, or rather obduracy, as it also is also liable to change (Hommells 2005; Shove 2014).

We are not only able to understand how practices persist, but also how they emerge, transform and disappear by looking at the way links are made and broken between meaning, materiality and competence every time a practice is enacted (Shove 2010). Thus, a focus on the practice of dwelling might help us reveal a potential for change. Through the case studies, we explore if, and how the combination of Ingold's concept of dwelling and Shove's concepts of practice and change can provide a productive framework for understanding the retrofitting and maintenance actions of homeowners in relation to decision making processes.

Methods

Through two cases we explore the possibilities of a practice of dwelling perspective. The first is a study of retrofitting in Norwegian homes, presenting the stories of two homes in the process of

retrofitting. The stories are selected from, and contextualised by a research project on the implementation of climate-related policy in home retrofitting which includes participation in door to door consultancy in 26 homes and interviews with 15 agents working to implement energy policy, some with experience from more than 500 home visits. In order to highlight the home owner perspective on policy we selected 5 among the home owners we encountered for interviews together with observations focusing on the material and technical aspects. These where selected as they were in the process of retrofitting at the time we met them and they were seen as representative for tendencies that had emerged during the research process in terms of life-situations, attitudes and types of houses. The first home owners, a couple in their fifties that had owned their semi-detached house for decades, left almost all work to professionals. The next two, one couple in their forties, and one in their thirties, both newly moved into their detached houses, shared the workload with professionals, while the latter two, a couple in their twenties and one in their forties, did most of the work themselves (DIY). During the interviews, the informants where asked to tell their story about the retrofitting they were doing. In order to accommodate thick descriptions (Geertz 1993), we present only two stories; those that most clearly illustrate tendencies we saw regarding decision making. The interviews were conducted between spring 2012 and autumn 2013, with follow up interviews in 2014, as the questions crystallised. All interviews with home owners took place in the respective homes.

The second case study looks at Danish homeowners' responses to policies aiming at promoting the installation of photovoltaic (PV) solar panels on private houses. The case is based on interviews with 11 homeowners living in single family homes in in Nakskov, a town in southern Denmark. The 11 homeowners were chosen to represent a broad variety of life situations. Four had young kids, two

had teenagers living at home, one lived alone and four were retired. As different perspectives as possible were aimed for. The interviews were carried out in November 2012 by the second author. Inspired by a life story interview approach (Atkinson 1998), the homeowners were initially asked to talk about their life in and work on the house in chronological order. The aim of this interview approach was to see what kinds of things and stories the homeowners connected to their practice of dwelling. All the interviews were conducted in the homes of the interviewees and lasted one to one-and-a-half hours. In the analysis process the interviews were first transcribed and thereafter coded with focus on material transformation of the homes. Also codes for PV technology, energy and climate change were used. This allowed us to analyse when and how the PV technology became part of the practice of dwelling.

In order to analyse the process towards deciding on getting PV technology we focus on homes in three different faces of this process. (1) One where the homeowners know about the technology, but never reach a moment of decision making, (2) two homes having considered PV technology and decided not to invest in the technology and (3) the one family among the 11 that had decided to invest in PV technology. These three perspectives demonstrate the whole process towards a moment of decision making regarding PV solar panels. In both cases, the interviewees are anonymised and the names used are pseudonyms.

Case 1: Decision Making Embedded in the Ongoing Practice of Dwelling

In all 5 houses interviewed, decisions regarding retrofitting can be seen as embedded in the practice of dwelling, but the tendency was more striking the more work home owners did themselves. We therefore present the stories from the two home owners that did most work themselves.

Home one: The plan takes shape in the actual work

A young couple, Birger and Anna bought a first floor flat in a wooden four-family house in a suburb. The house had been built in 1939 but had been renovated several times since then. The couple did not intend to carry out major retrofitting work, but they wanted to make the house look better. They wanted to change the old wallpaper in the bedroom. “When we ripped it off there was new layers of wallpaper, and then some ugly shipboards that we also tore off… Suddenly we stared straight into the wooden construction boards” Birger said.

The whole house was made of inch-thick wooden planks that served for both insulation and stability. Outside them was only the outer panelling. They decided to insulate the walls more significantly before installing new internal panels. Also, they began to tear off the wallpaper in the living room to see if the situation was similar there. So it was, and they tore off everything in that room to. To carry out the work properly, they also tore down the wall between the bedroom and the living room, in order to make all of the walls the same. They had also noticed that the floor was not level; it seemed to hang down from the walls, with its lowest point in the middle of the room. Birger said: “While we

stood here, looking at the floor, we thought: this will probably be our only chance to level this floor… Shit, let's do it." Thus, they started to dismantle the hardwood floor. Under the parquet they found a foot-thick layer of old dry clay, which separated their flat from the flat beneath them. It was the weight of this clay that made the floor hanging from the walls. The first interview was conducted at the point when the clay was removed and the interviewer could see it all: the floor of the living room was only a hole, looking down at the ceiling of the neighbour's flat below, and the walls were open to the outer panels, revealing daylight through the cracks. The couple now basically lived in the small kitchen. During the follow up interview Anna said that she never had expected to live in the kitchen for the next 6 months when they removed the first bit of wallpaper.

Home two: Retrofitting is a constant part of dwelling

This is a family of five: Hanne, Simon ant their three kids. They bought an old villa, which had originally been built as a two-family home in 1912 but had since been rebuilt to a single-family house and expanded with extensions several times. "When buying the house, we knew we were going to do something to it (retrofit) but we didn't know what", Hanne said. One of the first things they did was to install a ground to water, heat exchanger on the advice of a friend who had done the same. The cost of this installation was approximately €24,000, of which they received €1000 in support from ENOVA. "We had it for, I think two years, only heating the tap water and the floors on a couple of rooms in the basement", Simon said, "but some day it shall heat all the floors". One summer, they decided to install floor heating in the living room. Hanne said that she and the kids went to a holiday place while

Simon began to tear up the living room floor. This proved to be a bigger operation than they had originally planned. “When we came back in August, it was just a hole here, right down to the basement,” Hanne said, pointing to the floor, “not safe for the kids.” Simon kept building through the autumn, “Christmas was the ultimate deadline” he said, “and we just made it”. “With nice warm floors”, Hanne added, but “Simon had lost 15 kilos, he was just sitting in sofa all Christmas.” Hanne simulated an exhausted face. But also she had been tired from taking care of the children, doing all the shopping and practically everything else. “At that point, we were fed up with retrofitting” Hanne said. But the urge to retrofit returned next summer. “We decided to change the windows” Simon said. This quickly led to the realisation that they also had to change the wall that held the windows. Simon showed the interviewer an open wall: “Look at this gap” He pointed to a 10 cm gap between the inner and outer panelling. “No wonder the wind is blowing in the living room”. Inside the wall he had found layer upon layer of handiwork of various quality. “I even found windows and a door that had been panelled in”. Thus the family decided to tear down the walls, leaving only the framework, but to begin with only one and a half walls. For this family daily life was formed by retrofitting projects and retrofitting was formed by the possibilities provided by daily life. Retrofitting had always been part of holidays, the economy and other aspects of dwelling.

The elements of dwelling

In both stories it is possible to see how retrofitting and decisions regarding it, is embedded in the practice of dwelling. By analysing them in terms of Shove's three elements we may see how dwelling

occurs as embedded practice through contextualized and ever evolving meaning, competence and materiality, and how a readiness for decision making also is created in this process.

The above homeowners listed economy as the most important reason for doing most of the retrofitting themselves; this was the only way they could afford it. But at the same time, they pointed out that DIY work was *meaningful* and generated a good feeling. Retrofitting work was also described as fun, but this was ambivalent. Both families said that the fun disappeared as the projects drew out in time. The home owner that left all the work to contractors differ in these two points, as their economy allowed to pay for contractors, and they did not find DIY particularly meaningful.

Certain competences are clearly necessary for doing retrofitting. In both the above cases homeowners described themselves as "handy", again in contrast to the one that left all the work to contractors. However they saw themselves as novices in the craft of DIY when buying their houses, but they gained skill through experience. For both, friends and family contributed with advice as well as practical help. Also, professional craftspeople played an important role in performing difficult work and giving advice. Learning DIY is embedded in practical work dealing directly with the materiality of the house in a way that – for example – Internet information is not. Competence is not something one just has, or that can be transmitted through information. Competence builds on itself through practice over time.

Retrofitting deals with the material elements of the house. Even though houses in Norway tend to be built quite uniformly, reflecting the particular period in which they are built (see overview in ENOVA 2012), most of them become subject to retrofitting, giving them an individual touch in terms of

appearance and energy qualities. In this way, the materiality of the house is shaped by decades of dwelling practice, but this materiality also shapes the dwelling practice for present and future dwellers. Both houses offered surprises for the homeowners that determined the course of their retrofitting work and dwelling in these homes. When the young couple decided to tear off the first bit of wallpaper, they never expected to retrofit the walls and floor, and when the second family made a decision to change windows, they did not plan to retrofit all the walls.

Retrofitting leading to a readiness for decision making

The retrofitting being performed in this case is contextualised by governmental efforts to enhance climate-friendliness. This includes policy tools such as economic support for deep renovation and energy saving technology. But also efforts aimed at producers to make building components more climate-friendly. This may be important as retrofitting consists of a number of smaller actions, such as changing a single window. Both home owners ended up with energy glass when they changed windows, even though they did not actively make a decision about this. As such, climate policy aimed at window-producers was able to interact with their practice of dwelling in a way that support for deep renovation was not.

Both home owners were asked if they ever considered applying support for deep renovation. Birger said that he had looked into the possibilities very briefly at some point, but never considered it properly. Simon said that that he had applied for support for the heater, but never for deep renovation. Achieving support for the heater had been easy as the support program fitted well with

the practice of installing it. This already had to be done by professionals that also demanded a clear decision before they started. Thus the decision to install the heater was of the same kind as the decision to apply for support. On the other hand, the support program for deep renovation did not fit well with the way retrofitting was performed in the practice of dwelling. The program demands that prior to making the application for support, an energy consultant creates a total plan for the retrofitting project estimating the energy benefits. As such, a decision regarding the entire renovation project needs to be made before any work begins. Contrary to this, for both home owners the retrofitting plan took form as the work proceeded, and decisions were made along the way. It was not until the walls were opened that Birger and Anna realised their material possibilities, and only after having done some retrofitting did Simon feel competent to embark on the next project. Not only is it difficult to locate one big decision on the part of the homeowners in relation to retrofitting, but it is also only when the retrofitting work has been going on for some time that 'a readiness for such decision making' is reached. Also the home owners that that left more work to contractors explained that decisions had to be made as the project unfolded.

Case 2: Readiness for Decision Making is Created by Changes in Meaning, Materials and Competence

For a number of years up until 2012, a national support programme 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.[1] 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. Earlier studies have argued that the role of subsides might be overestimated in relation to energy retrofitting (Perman 2008, Henning 2008). In this part of the article we therefore question the effect of these subsides by analysing which other factors might influence the process towards investing in PV technology. The reason for focusing on PV technology is that most of the households in this case study mentioned PV solar panels during the interview. Two of the 11 households had been considering them in detail, but at the time of the interviews only one family had purchased solar panels for their house. We found this interesting to explore in more detail. Using the practice of dwelling perspective, we seek to understand the differences in the homeowners' responses to the solar panel policy. Why did only one family decide to acquire PV solar panels when the opportunity for subsidies was the same for all?

All the interviewed homeowners had invested time and money into their houses. All had replaced windows and improved insulation. This shows that the reason that some homeowners did not invest in PV solar panels was not that they did not invest time and energy in improving their homes. Rather, possible explanations can be found in the way that changes in meaning, competence and materiality did or did not create a *readiness* for energy-related decisions to be made.

[1] Since 19 November 2012, new rules have applied to homeowners ordering PV solar panels ('Lov om ændring af lov om fremme af vedvarende energi, lov om elforsyning, lov om afgift af elektricitet og ligningsloven' 2012).

When a readiness for decision making is never reached

The main reason the homeowners gave for changing windows and improving insulation was that their house was too difficult or too expensive to heat. In this way, the materiality of the house did not match their expectations of comfort and convenience. Improving the insulation of walls or windows therefore was expressed as a natural thing to do and a meaningful part of the practice of dwelling, and the homeowners did not have to do any more detailed research about it. In contrast, installing PV solar panels clearly held a different status in the homeowners' practice. For most of the homeowners, solar panels were acknowledged as an option, but not something to which they had given much thought.

The homeowners had heard about the technology, but they had no detailed knowledge about it. Thus, the meaning and competence connected to PV solar panels were different from those connected to insulation and new windows. The homeowners did not have the necessary competence to evaluate in detail whether solar panels would be a good solution for them. To gain this level of knowledge, they had to invest a large amount of time and energy. As Ole said: "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 [Ole's household had electric heating]. But most of the time, in the summer, we don't think about it." This quote shows that the family had been talking about it, but had never got further in the process. In this way, Ole's family had not decided *not* to invest in solar panels, but had simply never reached a *readiness* for this decision.

When a readiness for decision making is reached for not investing in PV solar panels

Two of the interviewed families had been looking into the option of PV solar panels but had decided *not* to make the investment at that moment. Dan talked about how he had been considering investing in solar technology if they were to build a new house, but on his current house, he did not see it as an option: "On this old house no PV solar panels or other things will get on the roof. From the beginning I asked, do they really know how heavy those things are? So no, I do not dare it. And I also don't think it looks good on such an old house."

The second family gave aesthetics as their main reason for not investing in PV solar panels. Their perspective was that the look of the solar panels would destroy the aesthetics of their house. Here the meaning the homeowners attached to what a nice house should look like did not include solar panels. Therefore the materiality of the house in connection to the meanings related to aesthetics made them decide not to invest in this new technology. It is interesting to note that economy was not the turning point, and none of the families claimed that options for subsidies and other economic support had any influence on their final decision. Now we turn to the single family who did acquire PV solar panels, to analyse how their practice of dwelling developed differently from the rest.

When a readiness for decision making is reached to invest in PV solar panels

In the interview, Anna explained that her husband had been talking about PV solar panels for some time. Anna stated that the main reason they had come to see solar panels as a good solution was that

they had believed that electricity prices would continue to rise and that the only solution therefore would be to become self-sufficient. Anna argued: "We have friends and relatives who are electricians choosing to install them, because, as they say, it's the only option." A central part of why the technology became meaningful for Anna and her family was in this way their perception of how the collective electricity system would develop in the future. This was, to a large extent, shaped by the advice and understandings of persons in their social network.

Anna explained that, a few years back, she – just like the other interviewed homeowners – had had limited knowledge about the solar technology, and she had never considered it as an option for herself and her family. She further explained that her husband had found it difficult to convince her, as she had thought they would have to borrow too much money to afford it. 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. This illustrates how changes in meaning led to new competences. Both Anna and her husband acquired new knowledge and understanding during this process. For Anna, electricity went from something for which she just paid a bill to something much more concrete and visible – something she could monitor and create herself. In this way, energy production became a meaningful part of their practice of dwelling.

It is further relevant to compare Anna's family to the two families that decided not to invest in PV solar panels for different material and aesthetical reasons. Anna explained that their house was not perfect for solar panels: "(…) because the house actually is not optimally located to get the most out of PV solar panels on the roof. This means that we need to have more panels than others." She

further described her nervousness about how they would look on the house. This shows that also for this family, material factors could have created an argument for not investing in PV solar panels. However, for Anna and her husband, individual and independent energy production had grown to be such a meaningful part of their dwelling practice that they decided to overcome the material constraints. First, their earlier trust in the collective energy system was questioned through conversations with friends and relatives. Later, through their research related to PV technology, those concerns had grown to a new way of giving meaning to energy production. This indicates that factors that at first glance seem to set limits for certain technologies are, in reality, changeable. In this case, changes in meaning and competence transformed the experienced material possibilities of the house.

The process towards a readiness for decision making

In Anna's case – as well as the two cases in which the families decided not to invest in PV solar panels – the long process of change and new connections between elements of materiality, competence and meaning led to a situation in which a decision took place. All of those smaller changes created a *readiness* for a decision to be made. For the rest of the 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 decision making. This process towards creating a readiness in meaning, competence and materiality therefore seems central for understanding when homeowners invest in energy technologies such as PV solar panels.

During a long process, Anna's family reached a readiness for decision making and ultimately decided to purchase PV solar panels. But at that point they could also have decided that this was not a good option for them, as two of the other families did. For Anna and her husband, the possibility of receiving subsidies and tax incentives clearly influenced their decision. Anna said that – without tax benefits and the system of "saving" energy for later – they would probably not have chosen to install the solar panels. However, for the largest group of homeowners, this economic incentive did not have an effect, as they did not go through the process that created a readiness for decision making, and therefore never reached a point at which a decision could be influenced by economic incentives.

It is clear that all of the interviewed homeowners acquired large amounts of competence and understanding from persons in their social network and from local professionals – or from a combination of these, in cases where friends and family were employed in the building trade. This indicates that educating tradespeople in energy efficiency and climate adaptation could enable policymakers to create the needed readiness for this kind of decision making. This analysis therefore supports such political measures, which have already been implemented a few places in Denmark (Danish Ministry of Climate, Energy, & Building 2013a, p. 48; Videncenter for energibesparelser i bygninger 2014), as well as Norway where builders and employees in DIY stores are trained as energy consultants (Lavenergiprogrammet 2014).

Conclusion

Based on Elizabeth Shoves's practice theory and Tim Ingold's concept of dwelling, we see retrofitting not as an isolated event in time and space, but as part of an ongoing practice of dwelling. We find the combination of these two theories useful for understanding why homeowners react or do not react to economic and political incentives in the ways expected by policymakers. Also, the obduracy of the practice of dwelling give insight in why it is difficult to transform as well as how change actually takes place and is motivated.

By focusing on practice, we have worked to see beyond the perspective of decision making in two cases: Case 1 illustrates how decision making is embedded in the ongoing practice of dwelling. Here it is difficult to identify any clear moment of decision making. Rather, the need for more extensive retrofitting becomes apparent in an unfolding manner, inseparable from the ongoing retrofitting work and the practice of dwelling. It would have been futile to ask these home owners to make a definite decision regarding their retrofitting project before the work started, as the readiness for such a decision only evolved though the actual work. Readiness as a conceptual tool for understanding the practice of dwelling still applies in Case 2, although through different mechanisms, as the installation of PV solar panels is characterised by a distinct point at which commitment must be made. However, in most of the homes, no decision to invest in PV panels took place, but among these homes, some had moved from no-decision state into a decision process, while others had not. We argue that this move is just as important as the outcome of the decision, and should be subject to increased attention.

The two cases highlight that for a decision to be made and a change to take place, a readiness for the decision must develop in the practice of dwelling. This readiness may come through gradual changes in material possibilities as well as the meanings and competences of homeowners, for example through retrofitting work. Thus, we have paid attention to the role of smaller acts of retrofitting and maintenance. Our argument is that too great a focus on large projects and decisions may cause us to miss the opportunity to influence the many smaller changes that are continually performed by homeowners; small changes that not only add up to larger projects, but also act as steps towards a readiness for larger decisions. We therefore encourage decision makers aiming to influence homeowners' renovation practice to aim more broadly than at decisions regarding mayor retrofitting projects. A sole focus on the outcome of mayor decisions may cause us to neglect the steps that create a readiness for such decisions. If this readiness is never achieved, there is little use in trying to influence the outcome of the decision, as it will not be made.

Acknowledgements

We wish to thank our three anonymous reviewers for valuable and helpful feedback.

The research presented in this article was funded by the 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.

References

Atkinson, R. 1998. *The life story interview*. Thousand Oaks, CA: Sage.

Ajzen, I. 1985. From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelber, New York: Springer-Verlag: 11-39

Bartiaux, F., K. Gram-Hanssen, P. Fonseca, L. Ozoliņa, and T.H. Christensen. 2014. A practice-theory approach to homeowners' energy retrofits in four European areas. *Building Research & Information* 42(4): 525–538.

Copenhagen Municipality. 2009. *Københavns klimaplan*. Copenhagen.

Danish Ministry of Climate, Energy, & Building. 2013a. *Kommunal klimaguide*. Copenhagen.

Danish Ministry of Climate, Energy, & Building. 2013b. *Regeringens klimaplan: På vej mod et samfund uden drivhusgasser*. Copenhagen.

Dowling, R., and K. Mee. 2007. Home and homemaking in contemporary Australia. *Housing, Theory and Society* 24(3): 161–165.

Enova. 2012. Potensial- og barrierestudie: Energieffektivisering av norske boliger – Bakgrunnsrapport. *Enova rapport*. Trondheim.

Fawcett, T. 2013. Exploring the time dimension of low carbon retrofit: Owner-occupied housing. *Building Research & Information* 42(4): 477–488.

Gallup, T.N.S. 2012. *Bolius Boligejeranalyse 2013*. Bolius, Boligeejernes Videnscenter.

Geertz, C. 1993. Thick Description: Toward an interpretive Theory of Culture. *The Interpretation of Cultures*. London: Fontana Press.

Graham, S., and N. Thrift. 2007. Out of order. *Theory, Culture & Society* 24(3): 1–25.

Gram-Hanssen, K. 2010. Standby consumption in households analyzed with a practice theory approach. *Journal of Industrial Ecology* 14(1): 150–165.

Gram-Hanssen, K. 2011. Understanding change and continuity in residential energy consumption. *Journal of Consumer Culture* 11(1): 61–78.

Halkier, B., and I. Jensen. 2011. Methodological challenges in using practice theory in consumption research. Examples from a study on handling nutritional contestations of food consumption. *Journal of Consumer Culture* 11(1): 101–123.

Hand, M., E. Shove, and D. Southerton. 2005. Explaining showering: A discussion of the material, conventional, and temporal dimensions of practice. *Sociological Research Online* 10(2).

Henning, A. 2008. The illusion of economic objectivity: thinking local risks of credibility loss to global risks of climate change. *Journal of Risk Research* 11 (1-2): 223-235.

Holden, E., and K. Linnerud. 2010. Environmental attitudes and household consumption: An ambiguous relationship. *International Journal of Sustainable Development* 13(3): 217–231.

Hommells, A. 2005. Studying obduracy in the city: Toward a productive fusion between technology studies and urban studies. *Science Technology and Human Values* 30: 323-351

Ingold, T. 2000. *The perception of the environment: Essays on livelihood, dwelling and skill*. London and New York, NY: Routledge.

Ingold, T. 2013. *Making: Anthropology, archaeology, art and architecture*. Abingdon: Routledge.

Judson, E.P., and C. Maller. 2014. Housing renovations and energy efficiency: Insights from homeowners' practices. *Building Research & Information* 42(4): 501–511.

Lavenergiprogrammet. 2014. Bli energirådgiver med støtte fra Enova – Husbanken [Become energy counsellor with support from Enova – The Housing Bank]. Http://www.husbanken.no/~/media/Miljo_energi/enova_kurs.ash.

Loewenstein, G. 2001. The creative destruction of decision research. *Journal of Consumer Research* 28(3): 499–505.

Lov om ændring af lov om fremme af vedvarende energi, lov om elforsyning, lov om afgift af elektricitet og ligningsloven. Http://www.retsinformation.dk, Pub. L. No. 1390 (2012 2012/12/23/).

Maller, C. J., and R. E. Horne. 2011. Living lightly: How does climate change feature in residential home improvements and what are the implications for policy? *Urban Policy and Research* 29(1): 59–72.

Maller, C.J., R.E. Horne, and T. Dalton 2012. Green renovations: Intersections of daily routines, housing aspirations and narratives of environmental sustainability. *Housing, Theory and Society* 29(3): 255–275.

Nicolini, D. 2013. *Practice theory, work, and organization: An introduction*. Oxford: Oxford University Press.

Orasanu, J., and T. Connolly. 1993. The reinvention of decision making. In *Decision making in action: Models and methods,* ed. G.A. Klein. Norwood, NJ: Ablex Pub.

Perman, K. 2008. *Från el till värme*. Frölunda: Örebro University

Petersen, L.K. 2008. Autonomy and proximity in household heating practices: The case of wood-burning stoves. *Journal of Environmental Policy & Planning* 10(4): 423–438.

Shove, E. 2003. *Comfort, cleanliness and convenience: The social organization of normality*. Oxford, NY: Berg.

Shove, E. 2010. Beyond the ABC: Climate change policy and theories of social change. *Environment and Planning A* 42(6): 1273–1285.

Shove, E. 2014. Demanding Ideas. Working paper 10. http://www.demand.ac.uk/wp-content/uploads/2014/07/wp-10-shove.pdf

Shove, E., M. Pantzar, and M. Watson. 2012. *The dynamics of social practice: Everyday life and how it changes*. Los Angeles, CA: Sage.

Simon, H.A. 1955. A behavioral model of rational choice. *The Quarterly Journal of Economics* 69(1): 99–118.

Simon, H.A. 1976. *Administrative behavior: A study of decision-making processes in administrative organization*. New York, NY: Free Press.

SKAT 2012. Den Regnskabsmæssige Metode for Skat Af Vedvarende Energianlæg. https://www.skat.dk/SKAT.aspx?oId=1973865&vId=0

Skov, A. 2010. *Bolig og velfærd: 27 forskningsprojekter om danskerne og deres boliger*. København, Center for Bolig og Velfærd: Realdania Forskning.

Videncenter for energibesparelser i bygninger 2014. Uddan Dig I Energibesparelser. Http://www.byggeriogenergi.dk/inspiration-til-lavenergi/uddannelse.aspx.

Wilson, C., L. Crane, and G. Chryssochoidis. 2013. The conditions of normal domestic life help explain homeowners' decisions to renovate. *ECEEE 2013 Summer Study, Rethink, renew, restart*. Belambra Presqu'île de Giens, France, The European Council for an Energy Efficient Economy (ECEEE).

Uddan dig i energibesparelser. 2014. Videncenter for energibesparelser i bygninger. Http://www.byggeriogenergi.dk/inspiration-til-lavenergi/uddannelse.aspx.

Vlasova, L., and K. Gram-Hanssen. 2014. Incorporating inhabitants' everyday practices into domestic retrofits. *Building Research & Information* 42(4): 512–524.

Warde, A. 2005. Consumption and theories of practice. *Journal of Consumer Culture* 5(2): 131–153.