

Concerned consumption. Global warming changing household domestication of energy

Margrethe Aune ^a

Åsne Lund Godbolt ^{a,b}

Knut H. Sørensen ^a

Marianne Ryghaug ^a

Henrik Karlstrøm ^a

Robert Næss ^a

^a Department of Interdisciplinary Study of Culture,
Norwegian University of Science and Technology, NTNU
Dragvoll, N-7491 Trondheim

^b SINTEF Byggforsk,
P.O. Box 124 Blindern, 0314 Oslo

Corresponding author: Knut H. Sørensen

Email: knut.sorensen@ntnu.no

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Abstract

This paper addresses possible effects of the growing focus on global warming on households' domestication of energy and the dynamics of energy consumption by comparing data pertaining to the domestication of energy within Norwegian households from two time periods: first, 1991-1995, when climate change was given little public attention, and, second, 2006-2009, after climate change became a major public concern. In the first period, the domestication of energy resulted in an energy culture emphasizing comfort and convenience with respect to everyday life and the abundant supply of clean hydropower. In the second period, this culture seemed to have changed, making many households concerned about their energy consumption. Consumption of energy was linked to climate change, and many interviewees claimed to save energy. However, the dominant expectation was still to be able to manage everyday life in a convenient and comfortable way. Thus, climate change concerns produced important but not comprehensive changes in the domestication of energy. A main effect was feelings of guilt, tempered by arguments regarding why change is difficult and complaints about political inaction. Thus, public engagement with climate change issues may facilitate energy efficiency policy but to succeed, wider climate policy measures seem to be needed.

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Introduction: A changing context of energy consumption

In most countries, there is an increased focus on energy saving in households because energy consumption is seen as a vital issue in climate change mitigation. This paper investigates how increasing public concerns regarding climate change may effect household consumption of energy, re-analyzing data from qualitative interviews and quantitative surveys. The data have been collected in Norway during the last two decades, and offers a rare opportunity to explore possible changes in energy cultures over a longer period of time. Such a study is important because of the widespread assumption that such cultures are rather resilient to change (see, e.g., Stephenson et al., 2010; Gram-Hanssen, 2011).

Norway should be an interesting context of this kind of analysis because, contrary to expectations driven by substantial population growth and increased levels of comfort, household energy consumption leveled out during the period we analyze (Aall, 2013). However, Aall offers only a few suggestions to explain this rather surprising finding, like increased energy efficiency of homes through energy saving technologies and refurbishment. This paper goes beyond such quantitative analysis by exploring the dynamics of households' domestication of energy that results in particular energy cultures – assemblages of knowledge, action, everyday life routines, norms and material objects (Stephenson et al., 2010) – focusing on the role of climate change concerns.

Norway also represents an interesting context for studying the extent to which climate mitigation issues transform people's relationship to and consumption of energy, because the country could be considered "a hard case" for such changes. For example, the level of security of supply has remained high, with fairly abundant resources of oil, gas and relatively cheap renewable hydropower. Nearly all Norwegian electricity is renewable but investment in new renewable energy has started to grow (Skjølsvold et al., 2014). Furthermore, since the late 1970s, energy efficiency has been on the political agenda with an increasing emphasis on the relationship between energy consumption and climate mitigation.

With regard to the public perception of anthropogenic climate change and the need for mitigation efforts in Norway, the situation is ambiguous. A majority of the population acknowledges climate change (Karlstrøm and Ryghaug, 2014), but there is widespread disagreement with respect to the seriousness of the situation (Ryghaug et al., 2011). Thus, while global warming is a widely recognized public concern, it is not clear how this affects household energy cultures, which shape the consumption of energy.

Previous studies have observed effects of public sustainability engagement. Karlstrøm and Ryghaug (2014) found that environmental concern influence decision-making with respect to household consumption of energy more strongly than economic issues. A similar finding is reported by DeCicco et al. (2015). Howel (2013) observed that climate issues were very important to people having adopted lower-carbon lifestyles, but with considerable diversity regarding what kind of climate issues that motivated them. Noppers et al. (2013) found clear links between perceived environmental qualities of sustainable innovations like electric cars and local renewable energy and the assessment and acceptability of such innovations. On the other hand, Sovacool and Blyth (2015) question the public's knowledgeability about energy and environmental issues, and thus problematize the idea that these issues actually are being linked. These contributions are important but more insight is needed into how households co-produce experience, concern and practice. We aim to contribute such insights, thus also providing knowledge that should be important to policy-makers trying to make household energy consumption more sustainable.

Traditionally, research on household energy consumption has framed this as mainly shaped by economic deliberations. It has focused on the effects of energy prices on consumption patterns, neglecting for example climate and other environmental issues. Another common framing of household energy consumption considers this to be basically a technological or techno-economic matter. This framing has also been found wanting (see, e.g., Guy and Shove, 2000: 63).

For our purposes, social science approaches are more relevant. They have been developed to overcome deficiencies of the economic and techno-economic understanding of the dynamics of household energy consumption. In particular, we are interested in how the influence of climate change concerns may be conceptualized. Some contributions focus on technology, innovation and (lack of) communication, stressing the importance of communicating about energy efficiency and

new energy technologies rather than social and value concerns. A main finding is that experts misunderstand how households make decisions because they do not grasp consumers' logic of energy consumption (Heiskanen and Lavio, 2010; Hyysalo et al., 2013; Palm 2013). This leads to the issue of how to comprehend this logic.

Scholars primarily concerned with barriers for energy efficiency tend to claim that there are only weak links between attitudes and practices. This suggests a lack of significant relations between total energy consumption and consumers' value patterns, motives and problem perceptions, implying that climate change concerns will have little significance (Abrahamse et al., 2005; Slocum, 2004; Thollander et al., 2010; Throne-Holst et al., 2007). However, this lack of influence may depend on the way households' consumption of energy is regarded by the surrounding community. For example, some studies present development of so-called low-carbon communities as a potential solution to overcome persistent challenges in energy efficiency policy, like social conventions and the helplessness of individuals facing the enormity of climate change. Thus, living in a community valuing climate mitigation efforts may make households become engaged in sustainable energy practices (Aall et al., 2007; Barr and Gilg, 2006; Heiskanen et al., 2010). To understand the logic of household energy consumption, one may also analyze empirically the actual economic practices of energy use. Such research has highlighted the complexity of households' decision-making, emphasizing the importance of both economic and environmental motives (Aune et al., forthcoming; Biggart and Lutzenhiser, 2007; Winther and Ericson, 2013).

The most comprehensive framework for analyzing household energy consumption and energy efficiency practices uses the concept of energy culture. This concept leads to a broad approach that includes, besides economic concerns, issues like values, household activities, acquired technologies, and everyday life routines. Thus, it takes on board many of the concerns of the other approaches. From the energy culture point of view, household energy consumption may only be understood through a contextualized examination of the interactions between norms, attitudes, material objects, and energy practices (Aune, 1998, 2007; Gram-Hanssen, 2010; Stephenson et al., 2010). This paper studies changes in Norwegian energy culture by employing domestication theory (Aune, 2007; Sørensen, 2006) to analyze our data. In the next section, we outline in some detail what this perspective entails.

Energy cultures and the domestication of energy: conditions for change

The energy culture framework implies that a realistic understanding of household energy consumption must consider such consumption to be enacted within a broad network of everyday life practices and infrastructures, including economic considerations (Aune, 1998; Shove, 2003; Southerton et al., 2004). Rather than a standard commodity, energy is a derived demand. In other words, energy is not used as such but as a consequence of other activities, including the employment of relevant technologies, such as cooking, cleaning, working or driving a car (see also Gram-Hanssen, 2011). Thus, the consumption of energy in a household is an effect of its energy culture, of the socio-material assemblage of the house, artifacts and activities (Strengers et al. 2014). We use domestication theory to analyze this, a theory that has been developed to study the making and remaking of such assemblages (Sørensen, 2006).

Analyzing processes of domestication of technology or knowledge means to study the construction of practices and meaning as well as related processes of learning. The focus may be a piece of knowledge, an artefact or a set of artefacts, like those constituting the material objects included in an energy culture (Sørensen et al., 2000; Sørensen, 2006). In this paper, our main concern is about if and how knowledge about human-made global warming and climate mitigation is enacted in everyday life and the extent to which this changes energy cultures. Such enactment may involve the articulation of positions with respect to the truth and falseness of knowledge claims, as well as consideration of how one should act on the perceived challenges: what to do – here, with respect to the energy consumption of the household. Thus, accounts of this domestication may indicate dismissal as well as acknowledgement of relevant contextual features, like market mechanisms and climate change challenges.

Domestication, then, is a process wherein the employment of technological objects and the understanding of scientifically described phenomena (such as energy efficiency or climate change) may be modified or transformed. In this manner, domestication analysis offers insight into changes that take place with respect to the human actions and the sense-making that are at the core of energy cultures (Aune, 2007). Outcomes of domestication may consequently be understood as micro-networks of humans, artifacts, knowledge and institutions. This means that, in addition to knowledge of energy efficiency and environmental problems (like global warming), knowledge of pertinent policy-making, political initiatives and everyday life practices may also be

domesticated (Sørensen et al., 2000). For example, political action related to climate mitigation may be interpreted as a statement about climate science and the need to enact such knowledge (Ryghaug et al., 2011). For reasons of brevity, this paper uses the short term domestication of energy to include the above-mentioned relevant issues like climate change, knowledge about energy efficiency, etc.

When we consider domestication of energy-related artifacts and knowledge in households to result in energy cultures, we see these cultures as constructed through negotiations between individuals, knowledge about science and energy policy, technology and the wider context (Aune, 1998; Stephenson et al., 2010, Strengers et al., 2014). Energy cultures consist of everyday life actions, but also of interpretations of energy, energy-related artifacts, and energy policies. In order to better understand the factors that influence energy consumption and to help identify opportunities for change, consumer energy practices can be understood at their most fundamental level through examination of energy cultures through studying the interactions between cognitive norms (e.g., beliefs, understandings), material objects, and energy practices (e.g., activities, processes) (Stephenson et al., 2010).

The domestication-based energy culture framework is change-oriented, rather than deterministic: "wider social, environmental and economic forces *structure* but do not *determine* people's cognitive norms, practices and material cultures" (Stephenson et al., 2010, p. 6127). According to Lefebvre (1971), everyday life is related to the critical assessment of activities, and such assessment obviously represents a potential force of transformation. However, everyday life routines may be solidly embedded in the technologies that support these routines (Lie and Sørensen, 1996). Moreover, the conduct of these routines seems to be based on widespread expectations of comfort and convenience (Aune, 1998; Shove, 2003) and may thus be quite resilient towards changes in beliefs and attitudes. Thus, we need empirical analysis to see if increased concerns over climate change, which potentially may lead to a reassessment of everyday life, actually are changing households' domestication of energy.

Method

Methodology

This paper examines whether Norwegian energy culture has changed due to increased popular awareness of climate change through the use of domestication theory. This means that we – as suggested above – focus on three aspects: (1) Changes in energy-related practices, in particular with respect to energy efficiency and energy saving, (2) Changes in the sense-making related to the use of energy, and (3) Related processes of learning. Most studies of domestication employ data from interviews, surveys and/or printed sources (Berker et al, 2006; Liste and Sørensen, 2015). Thus, they mainly consider people's accounts of their practices, sense-making and learning.

Panel data would have been ideal for our purposes. Since such data were not available and we believe there is a great need to explore the possible impact upon energy culture of the climate change issue, we decided to base our analysis on a series of interview studies and surveys that were at our disposal. These data were collected in two four-year periods: 1991-1995 and 2006-2009. In the first period, the public focus on climate change was modest. In the second period, the focus was much more outspoken. We believe that the amount of time between these periods should allow for changes in energy cultures and the analysis has aimed to identify indications of such changes.

The re-analysis was done partly by drawing on previous publications (see Table 1 below for details) but also by returning to the original data. Each of the authors has been engaged in collection and/or analysis of at least one of the datasets. The re-analysis has been done in pursuit of domestication-generated questions but also with inspiration from grounded theory in the form of abduction (Reichertz, 2007).

Given that our main concern is related to the enactment of particular types of knowledge, above all about climate change and energy efficiency, we began by looking into accounts related to sense-making about these issues to see if there had been changes here. Could we observe changes in the ways people thought about energy and their use of energy in the Norwegian context? To do so, we studied interview accounts and survey responses regarding how the supply of energy was reflected upon, if climate change concerns were seen as relevant issues when

considering the consumption of energy, and how interviewees perceived the implications of such relevance.

The practice aspect of domestication was explored by analyzing accounts and responses about engagement with energy efficiency and energy saving, and comparing the two time periods. This included inquiries about retrofitting but also about efforts to change everyday life routines. Could we observe changes in the accounts from the two periods? Were changes influenced by climate change concerns? Learning, the third aspect of domestication, was explored in relation to sense-making and practices but given less explicit attention.

Data

Five sets of data have been employed in the paper. Dataset 1 consists of a national survey of 1,050 persons that was conducted in 1991. Dataset 2 comprises a qualitative interview study of energy consumption and everyday life, including how people perceived their energy situation at the time. Thirty-four in-depth interviews with altogether 60 persons were conducted between 1992 and 1995. Both sets of data are described in greater detail in Aune (1998).

Dataset 3 comprises ten focus group interviews with a total of 62 participants that were conducted between 2006 and 2007. These interviews were primarily concerned with climate change issues, but included questions related to energy culture. Further details are provided in Ryghaug et al. (2011). Dataset 4 is a national survey of 1,500 persons that was undertaken in 2009. This survey covers attitudes towards sustainable energy as well as accounts of energy consumption and energy efficiency activities in households (see Karlstrøm (2010) for further details). The final dataset (dataset 5) comprises a series of focus group interviews that were conducted in 2009. Forty-four persons in nine focus groups were asked about their energy consumption and energy efficiency activities (see Godbolt (2015) for further details). Table 1 provides a brief overview of the datasets.

	Time period	Data collection period	Method	Main source
1	First	1991	National survey	Aune (1998)
2	First	1992-1995	Qualitative interviews	Aune (1998)
3	Second	2006-2007	Focus group interviews	Rygghaug et al. (2011)
4	Second	2009	National survey	Karlstrøm (2010)
5	Second	2009	Focus group interviews	Godbolt (2015)

Table 1. Overview of the datasets

The qualitative and focus group interviews lasted one to two hours and were taped and transcribed. The quotes used in this paper were translated from Norwegian by the authors, and we have tried to retain their oral qualities. The qualitative datasets were originally anonymized through the attribution of fictive names to the interviewees. When we quote from the interviews, we use these names and mention the dataset they belong to in order to reference the data. For example, if a quote is linked to “Åshild, 2,” this means that the quote was taken from the Åshild interview transcript in dataset 2.

How valid are the comparisons between the datasets? Clearly, some reservation has to be stated since originally, the datasets were not designed for such comparisons. While the two surveys were sampled to be representative of the Norwegian population, the participants in the three qualitative studies were strategically sampled to achieve diversity in terms of age, gender, level of education, occupation and regional belonging. All levels of education were represented among the interviewees, and there was considerable variation in terms of engagement with environmental and climate change issues. Consequently, in the analysis, we have in particular looked for diversity rather than uniformity with respect to the accounts provided in the datasets about the domestication aspects and features of the energy cultures in the two periods. Nevertheless, we observed some distinct overall changes in the domestication of energy, primarily with respect to concerns about the consumption of energy that were articulated widely in the datasets of the second period but nearly not mentioned in the data from the first period. Thus, we believe this important finding of the paper to be fairly robust.

The impact of climate concerns: Changes in the symbolic dimension of the domestication of energy

According to the two datasets from the first period, Norwegian consumers' perception of their energy situation unanimously emphasized the plentiful availability of energy and the non-threatening environmental implications of Norwegian energy consumption. The impression of the interviewees was that Norway had nearly abundant sources of clean hydropower. Thus, they were not concerned about energy security or environmental implications of energy consumption. One interviewee put it like this: "Don't we have enough energy? It's raining a lot here so that shouldn't be a problem (...). And electrical power is clean and environmentally friendly, isn't it?" (Åshild, 2).

This quote expresses a widely shared sentiment of that period; that Norwegians live in a state of a perpetual energy surplus. This assertion was made by people with different social background, age, gender, attitudes towards energy use, and knowledge about energy-related subjects. An elderly man simply stated that: "As far as I can see, the supply of power that we have in Norway makes us very fortunate (...). And I prefer that they develop some more [waterfalls] if there is a need for more electrical power. It is the cleanest energy we can have" (Harald, 2). Or, as a young woman phrased it: "I envision all these rivers, they never stop flowing. Moreover, we sell electricity to other countries (...) I believe we always will have enough energy" (Hanna, 2).

Thus, in the first period, energy was domesticated in a way that produced an optimistic interpretation of energy – electricity, in particular – as abundant and clean. There were very few references to climate change in dataset 2, and such concerns seemed not to motivate any of the interviewees to save energy. To the extent that interviewees articulated such motivation, this was made with reference to a belief that wasteful behavior is wrong. Some were concerned about driving cars but this was not related to climate change either.

At the turn of the millennium, global warming concerns were increasingly voiced in Norway (Ryghaug et al., 2011). In public discourses, it was argued that consumption of energy, including electricity from hydropower, is a climate mitigation problem. One of the arguments was that

renewable hydroelectricity could be exported to replace coal power in other countries. Thus, the previously pre-dominant interpretation of energy as abundant and clean was challenged.

Furthermore, datasets 3 and 4 show a widespread acknowledgement that climate change is human-made. According to the 2009 survey (dataset 4), nearly 70 percent of the Norwegian adult population agreed that the climate change problem was serious or very serious. The focus group interviews in dataset 3 provide a somewhat more nuanced picture, showing how many of the interviewees struggled to make sense of what they considered contradictory pieces of information. The following quote from a woman in her 30s illustrates this:

There are various scientists with different opinions about [climate change] all the time, so then I think that maybe it isn't so bad. It stands to reason that it's pollution and such that make this [global warming], because we haven't had such things on Earth before, but at the same time you think that maybe this is just natural (Thale, 3).

However, although climate change concerns proved to be debatable, they were still taken on board in many accounts of energy culture. How did this influence sense-making?

As we have seen, in dataset 2 interviewees referred to Norway's fortunate situation with respect to energy and said that there was sufficient, clean energy for domestic energy consumption. The findings from the focus group interviews from the later period (datasets 3 and 5) clearly suggest that a change in attitude had taken place. Over several cold winters, Norway had imported electricity; after this, the country was no longer seen to have abundant clean hydroelectricity. Rather, energy production was considered a cause of climate change and environmental problems. As one man expressed:

In Norway we've been lucky to have hydropower (...). However, now we consume more than we manage to produce, which means that we need to get energy from other places, for example (...) be dependent upon the coal power plants in Denmark. Then Denmark will pollute more. We're just pushing the problem ahead of us (Ørjan, 3).

Not everybody agreed with this interpretation: “Energy problems? I don’t think so. Yes, we’re being told that we have an energy problem but I don’t know anybody who has an energy problem” (John, 3). Or, as Kenneth (5) put it:

If we look at the environmental gains of saving electricity (...). Like, the electricity is produced for free here in Norway. It comes out of the waterfalls, which run anyway if the power station is there or not. So how much it impacts the environment ... it must be without consequence whether you watch TV twenty hours a day, or just four.

Some thought that other energy actions were more pressing than saving electricity:

If you want to be environmentally friendly, I think you should leave your car or (...). There are so many other things you can do instead of turning off the light. Electricity in Norway is already green, we have so much hydropower, but of course you should be conscious about it (Astrid, 5).

Some interviewees felt that Norway’s general level of prosperity and dependence on oil and gas were among the biggest problems related to climate change. On this basis, they questioned the political will to engage in climate change mitigation. Some also noted a paradox: the authorities aimed for a continued, large production of oil and gas, while, at the same time, requesting that people should save energy, drive less and buy climate quotas when flying. Thus, politicians and public authorities were blamed for the lack of problem-solving action. Observations of a lack of political will (both nationally and internationally) to solve the problem also fostered a sense of powerlessness among many of the interviewees. The following quote may serve as an example:

The fact that I drive a car to work and back home again, means nothing for the well-being of the globe. I am fed up by everything being pushed down on ordinary people like me – why do we have to save and save and save? And at the same time, other people do as they please (Knut, 5).

Many also complained about a lack of realistic options for altering everyday life practices. Some also mentioned that it would be hard to achieve lifestyle changes: “If we want to save the environment, we need to lower our consumption. That is painful. I mean, what is more painful: turning off the light or not using your car?” (Astrid, 5).

To sum up, according to our data, the symbolic domestication of energy was different in the second period compared to the first. The main difference was that the sense-making was more complex and diverse with outspoken disagreements, and compared to the first period, more issues were mentioned by the people interviewed. Above all, climate change had become a prominent topic, even if it was interpreted differently. Apparently, most of the interviewees acknowledged that “something bad was going on” and that there was a link between energy consumption and climate change. However, to feel powerless and to make critical claims about political passiveness with respect to climate mitigation were fairly common among interviewees in datasets 3 and 5. This seemed to moderate the effect of climate change concerns.

Still, the emergence of such concerns did lead to the following two main changes in the symbolic domestication of energy from the first to the second period:

- The interpretation of energy in Norway as abundant and clean became much less common.
- Consumption of energy was to a much larger extent considered problematic and a matter of concern, and this was above all related to climate change. In this manner, the previously dominant idea that energy consumption was “innocent” was challenged, and the need to save energy acknowledged by many.

What did these changes mean with regard to the practice aspect of the domestication of energy?

The resilience of everyday life routines: Convenience and comfort

Considering the positive assessment of the national energy situation and the few critical remarks about everyday life, it is not surprising that the data from the first period (datasets 1 and 2) indicate little concern about the amount of energy used. In addition, since Norwegian electricity was viewed as clean, saving energy was not considered important from an environmental point of view. Accordingly, a main observation is that most of the people who were interviewed

expected to live a fairly comfortable life, feeling that they should be able to conduct their daily routines in a convenient manner. They refused to feel bad about this, even if it meant increased energy consumption.

A widespread argument for spending energy to achieve some pleasures (such as a comfortable indoor temperature in winter and long showers) and, in general, to have a convenient everyday life could be articulated as follows: “I consider warm indoor temperature to be, like, an aspect of well-being. I want to allow myself to be comfortable” (Åshild, 2). Or, as Karin (2) put it: “I think one has to allow oneself some privileges. I want my shower in the morning [laughs], and I don’t like to be cold.”

The survey from the first period (dataset 1) supports this observation. For instance, approximately 70 percent agreed (completely or partly) with the statement: “In our household we consume as much energy as we need in order to achieve comfort”; 68 percent agreed with the following: “We are used to unlimited access of heat, light and hot water and energy economizing [energy efficiency measures] must not take these benefits away.” Moreover, dataset 2 suggests that changes in everyday life routines were regarded as difficult to achieve without substantial sacrifices. The interviewees were not motivated to take on such disadvantages.

Wasteful behavior was frowned upon, but people were not expected to act thrifty. Rather, comfort and convenience were argued as acceptable goals. Nevertheless, some interviewees from the first period expressed a distinct moral obligation to save, but for other reasons:

It has to do with upbringing. We were taught not to make a mess, not to throw garbage around in the nature, to turn off the lights when you left the bathroom and (...) it’s not about environmental concerns really, it has to do with being a decent person, I think (Siri, 2).

Or, as stated by an elderly man: “In the old days wasting was culturally and morally reprehensible” (Nils, 2). The main reason offered for saving energy, in the few interviews where this became an issue, was to save money (or to avoid extravagant spending); thus, saving energy was considered an expression of sobriety. Moreover, there was diversity in respondents’ characterizations of

what they considered comfortable. For example, some interviewees considered a relatively low indoor temperature comfortable.

As we have seen, in the face of concerns over global warming, the energy situation was assessed less positively by many interviewees from the second period, who also expressed critical views of their domestication of energy. Did this produce changes with respect to the actual consumption of energy? To some extent, we found indications of such change with respect to practice. For example, it was common for interviewees from the second period to report intentions to reduce their energy consumption and that such steps already had been taken. The 2009 survey (dataset 4) found that 38 per cent of the respondents claimed to have introduced measures to save energy in their household, and 70 per cent said that they considered it very or somewhat important to save energy. Many of the respondents (60 percent) claimed to have changed their way of living as a result of the climate problem. When asked about what they had done, the most common responses were reduced energy consumption (50 percent), recycling (39 percent), and more frequent use of public transport (29 percent).

However, the findings from the focus group interviews (datasets 3 and 5) suggest that such changes were fairly moderate and did not radically alter the way people chose to organize their everyday lives. Demand for a comfortable indoor temperature and fairly unrestricted consumption of hot water, and high expectations regarding the size and standard of dwellings was strikingly parallel to what was found in the datasets from the first period. Still, many of the interviewees from the second period expressed frustration with respect to the perceived need to transform their everyday lives in ways that would lead them to consume less energy. Why were lifestyle changes considered so difficult?

A fairly typical response to questions relating to climate change mitigation practice was the following: “[I can do] little things, things that do not take too much time. Everyday life is so busy, and if it becomes a large project, then there are probably not so many who are willing to make the effort. If small actions contribute, then one may take part in it” (Tanja, 3). Family life was thought to limit the possibilities for changed energy practices, due to time issues:

I have three small children from six years old and younger, so we consume the energy we need, to put it that way. We constantly have to wash and dry clothes, but of course we turn off the lights and try to keep it [indoor temperature] low, but, you know ... (Erik, 5).

Thus, an important issue was the necessity of energy for carrying out everyday life routines in a satisfactory way with respect to effort and outcome. Interviewees expected to be able to live a comfortable life; thus, they wanted to be able to conduct their routines in a convenient manner. This attitude made their everyday lives fairly resilient regarding changes in energy consumption to mitigate climate change.

This resilience was not considered unproblematic. A fairly common point of view admitted a difference between acknowledging the need to do something and actually making an effort:

My husband and I talk about that, ideally, we should be more aware about our energy consumption, but in practice we don't do anything, we just talk about it. Nothing happens, at least when it comes to energy consumption in our house. Maybe we think more about energy or the environment in other situations; I don't know (Julie, 5).

In other words, the data from the second period suggest that the interviewees knew that they ought to save energy in order to contribute to climate change mitigation. Often, they expressed a guilty conscience with respect to their practices:

I feel that I'm morally committed to considering environmental issues, and if I do things that I know I shouldn't do, actions that're wasteful, I think about it. I get a guilty conscience if I, for instance, travel by air instead of taking the train, or if I take the car when I really should walk. At least I think about it. And I guess that's better than not thinking about it, at all. Although, of course, I should've changed my practice for real (Lise, 5).

In dataset 2 from the first period, comfort and convenience were assumed to be something people deserved. In the datasets from the second period we could observe that comfort and convenience came with the cost of guilt; no longer unequivocally deserved, but, rather, argued as necessary for the conduct of everyday life.

Bad conscience was, to some extent, moderated by other arguments that we observed from datasets 3 and 5. First, as already noted, many did not see the situation as sufficiently serious to merit action. Second, participants in the focus group interviews commonly argued that policy-makers and industry, rather than ordinary people, should be at the forefront of mitigation efforts. Many so-to-speak externalized the responsibility to act. Third, climate change issues were perceived as remote from everyday life concerns and less pressing than other problems.

Some also pointed towards what they saw as inconsistencies in how society developed. For example, the increasing availability of cheap air tickets and the support of motor sports were seen to be inconsistent with messages from climate scientists and politicians about the seriousness of climate change. John (3) argued that: "I think that most people try to do their best, but the current situation doesn't always make this easy, with the cheap plane tickets and everything."

The resilience of everyday life with respect to comfort and convenience was also justified in the focus group interviews (datasets 3 and 5) by frequent complaints that it was difficult to know what to do: "I think we've had enough information about the fact that there is a crisis and that the Earth is in trouble, but there isn't enough information about what *you* can do" (Katrin, 3). As previously mentioned, we also observed a widespread feeling of powerlessness among interviewees in the second period in the face of what were considered insurmountable challenges. This sense of powerlessness was used as an excuse to continue their ways of life. Others stated more bluntly that: "I don't think any of us around this table are willing to reduce our standard of living" (Eskild, 3).

To summarize, there were definite changes in the domestication of energy with respect energy culture practices. For example, we observed from the 2009 survey (dataset 4) that many claimed to engage in saving energy. However, the comparison between the interviews from the first period (dataset 2) and the focus groups interviews from the second period (datasets 3 and 5)

suggest that most changes were fairly modest. We observed four main arguments pertaining to changes in energy-related practices:

- Everyday life routines were seen as contained by expectations of comfort and convenience, which few were willing to curb. Reduced energy consumption – except when such savings could be easily achieved – appeared to be dissonant with the established everyday lifestyles.
- The responsibility to act was often argued to be a responsibility of politicians and industry, not of consumers, unless policy-makers provided proper regulations.
- Many voiced concern that there should be a fair distribution of benefits and strains with respect to climate change mitigation and energy consumption. Social justice was emphasized with respect to some mitigation initiatives, and a perceived lack of fairness was offered as yet another excuse for inactivity. In such ways, the resilience of everyday life was made into a political issue.
- Acknowledgement of human-made global warming made many admit that they ought to implement more wide-ranging changes. This offered challenges with respect to making a self-respecting assessment of one's everyday life.

Conclusion: Changed meaning, resilient but troubled practice

Has the increasing acknowledgement of human-made global warming during the last decade or so changed the domestication of energy and consequent energy cultures or have these cultures remained as stable as many believe? To provide an answer, we have re-analyzed and compared studies of Norwegian energy culture, conducted in the periods 1991-1995 and 2006-2009 using domestication theory. This means that, first, we have studied the symbolic aspects, the sense-making of energy, as accounted for by the interviewees. Here, we observed a quite marked change. In the data from the first period, energy was seen as a non-problematic issue because Norway was considered rich in clean hydroelectricity. Those who thought that energy saving was important did so mainly not to be wasteful. Climate change issues were barely mentioned, and they were not related to energy saving.

In the data from the second period, climate change concerns had become much more prominent and energy consumption was much more a matter of concern, even if there were disagreements.

Also, many interviewees were aware that Norway periodically imported electricity on a substantial scale, which meant that they no longer considered electricity as unambiguously clean. Furthermore, it was acknowledged that electricity savings might lead to export of clean energy to replace fossil production of electricity in other countries. Overall, in the focus group interviews from the second period, there was much more discussion and more issues raised in the sense-making of energy than in the interview study from the first period. Thus, the sense-making with respect to energy had definitely changed from viewing energy as “innocent” to become concerned, albeit in a complex and controversial manner.

Second, we studied if the practice aspect of domestication of energy had changed in a similar fashion, leading to increased efforts of energy efficiency and energy saving. Here, we also observed an impact of the climate change concerns since many of the respondents of the 2009 survey claimed to have reduced their consumption of energy. However, the focus group interviewees’ accounts (datasets 3 and 5) suggest considerable resilience of everyday life in this respect. We found few, if any, reports of radical changes, but many claimed to do “small acts,” such as recycling, saving electricity when it was easy to do so, and reducing car driving. “Small acts” were considered doable, while more comprehensive transformations were seen as too burdensome to undertake – at least when they were rendered as individual responsibilities and not as a shared, collective undertaking. In many cases, doubts prevailed over whether ordinary people could do anything to effectively mitigate climate change.

Such moderating influences included a fairly widespread reservation with respect to the seriousness of the climate change challenges and critical observations about a lack of engagement among politicians and their willingness to lead the way. Also, the responsibility to act was externalized by many interviewees. However, the effects of the moderating influences varied.

Previous studies have identified the dominant position of energy cultures that privileges comfort and convenience (Aune, 1998, 2007; Shove, 2003). Since energy cultures have been shown to be solidly embedded in everyday life practices, they have also been considered robust and fairly resistant to change (e.g., Stephenson et al., 2010; Gram-Hanssen, 2011). The findings in this paper give some support to these observations, but clearly, changes had happened. Thus, energy culture is less stable than often believed. First, the increased focus on climate change in public discourse

clearly affected sense-making with respect to energy, leading to greater ambiguity and concern about consumption of energy and feelings of guilt for not making enough efforts to reduce it. Such concerns were not found in the data from the first period. Second, many respondents claimed to have made changes in the energy practices to save energy. As we have seen, the changes were not radical but still noticeable, not the least as a contrast to the idea of energy cultures as very resilient. Since comprehensive transformations take time, climate change concerns may have a stronger impact on energy practices in the future.

This optimism has to be considered also in the light of the improved understanding of the dynamics of energy consumption that this paper offers. The moderating influences listed above definitively in many cases reduced the motivation offered to households by global warming concerns to change the way they domesticated energy to reduce consumption. Unless political measures (such as granting social justice by making changes mandatory) are implemented to reduce the effect of these moderating influences, concerns over sustained comfort and convenience in everyday life will probably continue to limit the changes in present energy cultures.

Thus, we believe that there are important policy implications of the emergence of what we call *concerned energy consumption*. The changes that we observe when comparing the data from the two periods challenge the understanding of present, comfort and convenience oriented energy cultures as stable and resilient. This represents a policy opportunity to counteract the moderating influences that support resilience and limits change. The concerned energy consumption may lead to more sustainable energy practices, but this requires the development of concerted and visible political measures that facilitate and motivate change.

A main issue is the public understanding of and engagement with climate change. While there is broad acceptance that climate change is human-made, there are disagreements about the seriousness of the climate problem. As we have shown, Norwegian climate policy has been – and probably still is – interpreted to be ambiguous and to provide inconclusive evidence that policy-makers really consider climate change a serious problem. Given the potential role of climate change concerns in changing the domestication of energy, it seems that a more transparent,

outspoken and action-oriented climate policy would be needed to help transform concerned into sustainable consumption of energy.

Further, our analysis shows that measures to support such transformation also should address issues like the need for collective action and social justice with respect to climate change mitigation; in addition to help identify the kind of transformation of the energy culture that should be given priority. Thus, energy culture may be considered dynamic in the face of global warming but the potential for change needs national and local political initiatives to be tapped effectively. Presently, figuring out how to amend the energy culture is rendered too much a task for the individual household.

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References

- Aall, C (2013): Why has the level of household energy consumption stopped increasing in Norway — and how to make it can we bring about a decrease? In: Hansson L, Holmberg U, Brembeck H (eds) *Making Sense of Consumption*. Gothenburg: University of Gothenburg, pp. 312-331.
- Aall C, Groven K, Lindseth G (2007) The scope of action for local climate policy: The case of Norway. *Global Environmental Politics* 7(2): 83–101.
- Abrahamse W, Steg L, Vlek C and Rothengatter T (2005) A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology* 25: 273–291.
- Aune M (1998) Nøktørn eller nytende. Energiforbruk og hverdagsliv i norske husholdninger [Sobriety or pleasure. Energy consumption and everyday life in Norwegian households]. STS report no. 34. Trondheim: NTNU.
- Aune M (2007) Energy comes home. *Energy Policy* 35: 5457–5465.
- Aune M, Godbolt ÅL, Sørensen KH (forthcoming) Mismatch or misunderstanding? Economists and consumers framing electricity consumption in a deregulated market. *Acta Sociologica*.

- Barr S and Gilg A (2006) Sustainable lifestyles: Framing environmental action in and around the home. *Geoforum* 37: 906–920.
- Berker T, Hartman M, Punie Y and Ward K (eds), *Domestication of Media and Technology*. Maidenhead: Open University Press
- Biggart NW and Lutzenhiser L (2007) Economic sociology and the social problem of energy inefficiency. *American Behavioral Scientist* 50(8): 1070–1087.
- Butler C, Parkhill KA and Pidgeon NF (2014) Energy consumption and everyday life: Choice, values and agency through a practice theoretical lens. *Journal of Consumer Culture*. Epub ahead of print October 19 2014. DOI: [10.1177/1469540514553691](https://doi.org/10.1177/1469540514553691)
- DeCicco J, Yan T, Keusch F, Muñoz DH and Neidert L (2015) U.S. consumer attitudes and expectations about energy. *Energy Policy* 86: 749-758.
- Godbolt, ÅL (2015) The ethos of energy efficiency: Framing consumer considerations in Norway. *Energy Research & Social Science*, 8: 24-31. DOI: [10.1016/j.erss.2015.04.005](https://doi.org/10.1016/j.erss.2015.04.005)
- Gram-Hanssen K (2010) Residential heat comfort practices: Understanding users. *Building Research & Information* 38(2): 175–186.
- Gram-Hanssen K (2011) Understanding change and continuity in residential energy consumption. *Journal of Consumer Culture* 11(1): 61-78.
- Guy S and Shove E (2000) *A Sociology of Energy, Buildings and the Environment. Construction Knowledge Designing Practice*. London: Routledge.
- Heiskanen E, Johnson M, Robinson S, Vadovics E and Saastamoinen M (2010) Low-carbon communities as a context for individual behavioural change. *Energy Policy* 38: 7586–7595.
- Heiskanen E and Lovio R (2010) User-producer interaction in housing energy innovations: Energy innovation as a communication challenge. *Journal of Industrial Ecology* 14(1): 91–102.
- Howell RA (2013) It's *not* (just) «the environment, stupid!» Values, motivations, and routes to engagement of people adopting lower-carbon lifestyles. *Global Environmental Change*, 23: 281-290.
- Hyysalo S, Juntunen JK and Freeman S. (2013) User innovation in sustainable home energy technologies. *Energy Policy* 55: 490–500.

- Karlstrøm H (2010) *Den deregulerte forbruker [The de-regulated consumer]*. Trondheim: Department of interdisciplinary studies of culture, Norwegian University of Science and Technology.
- Karlstrøm H and Ryghaug M (2014) Public attitudes towards renewable energy technologies in Norway. The role of party preferences. *Energy Policy* 67: 656–663.
- Lefebvre H (1971) *Everyday Life in the Modern World*. New York: Harper and Row.
- Lie M and Sørensen KH (1996) *Making technology our own. Domesticating technology into everyday life*. Oslo: Scandinavian University Press
- Liste, L and Sørensen, KH (2015) Consumer, client or citizen? How Norwegian local governments domesticate website technology and configure their users. *Information, Communication & Society*, 18(7), 733-746.
- Lopes MAR, Antunes CH and Martins N (2012) Energy behaviours as promoters of energy efficiency: A 21st century review. *Renewable and Sustainable Energy Reviews* 16: 4095–4104.
- Noppers EH, Keizer K, Bolderdijk JW and Steg L (2014) The adoption of sustainable innovations: Driven by symbolic and environmental motives. *Global Environmental Change*, 25: 52-62.
- Palm J (2013) The building process of single-family houses and the embeddedness (or disembeddedness) of energy. *Energy Policy* 62: 762–767.
- Reichertz J (2007) Abduction: The Logic of Discovery of Grounded Theory. In: Bryant A and Charmaz K (eds) *The SAGE Handbook of Grounded Theory*. Los Angeles, CA: Sage, pp. 214-228.
- Ryghaug M, KH Sørensen and Næss R (2011) Making sense of global warming: Norwegians appropriating knowledge of anthropogenic climate change. *Public Understanding of Science* 20(6): 778–795.
- Shove E (2003) *Comfort, Cleanliness and Convenience: The Social Organization of Normality*. Oxford: Berg.
- Skjølsvold TM, Ryghaug M and Dugstad J (2013) Building on Norway's Energy Goldmine: Policies for Expertise, Export, and Market Efficiencies. In: Evanthie M and Hills JM (eds) *Renewable*

Energy Governance: Complexities and Challenges. Lecture notes in Energy, London: Springer, pp. 337-349.

Slocum R (2004) Polar bears and energy-efficient lightbulbs: Strategies to bring climate change home. *Environment and Planning D: Society and Space* 22: 413–438.

Southerton D, Chappells H and Vliet BV (2004) *Sustainable Consumption*. Northampton, MA: Edward Elgar.

Sovacool BR and Blyth PL (2015) Energy and environmental attitudes in the green state of Denmark: Implications for energy democracy, low carbon transitions, and energy literacy. *Environmental Science and Policy*, 54: 304-315.

Stephenson J, Barton B, Carrington G, Gnoth D, Lawson R and Thorsnes P (2010) Energy cultures: A framework for understanding energy behaviours. *Energy Policy* 38: 6120–6129.

Strengers Y, Nicholls L and Maller C (2014) Curious energy consumers: Humans and nonhumans in assemblages of household practice. *Journal of Consumer Culture*. Epub ahead of print May 26 2014. DOI: 10.1177/1469540514536194

Sørensen KH, Aune M and Hatling M (2000). Against linearity: On the cultural appropriation of science and technology. In: Dierkes M and von Grote C (eds) *Between Understanding and Trust: The Public, Science and Technology*. Reading, UK: Harwood Academic Publishers, pp. 237-257.

Sørensen KH (2006) Domestication: The enactment of technology. In: Berker T, Hartman M, Punie Y and Ward K (eds), *Domestication of Media and Technology*, Maidenhead: Open University Press, pp. 40-61.

Thollander P, Palm J and Rohdin P (2010) Categorizing barriers to energy efficiency: An interdisciplinary perspective. In: Palm J (ed), *Energy Efficiency*. Available at: <http://www.intechopen.com/books/energy-efficiency/categorizing-barriers-to-energy-efficiency-an-interdisciplinary-perspective>.

Throne-Holst H, Strandbakken P and Stø E (2008) Identifications of households' barriers to energy saving solutions. *Management of Environmental Quality* 19(1): 54-66.

Thøgersen J and Grønhøj A (2010) Electricity savings in households – A social cognitive approach. *Energy Policy* 38: 7732–7743.

Winther T and Ericson T (2013) Matching policy and people? Household responses to the promotion of renewable electricity. *Energy Efficiency* 6: 369–385.