Heating practices during the energy crisis of 2022

the role of energy vulnerability and environmental concern

Gram-Hanssen, Kirsten; Madsen, Line Valdorff; Aagaard, Line Kryger; Nielsen, Rikke Skovgaard

Published in:
Sustainability: Science, Practice and Policy

DOI (link to publication from Publisher):
10.1080/15487733.2024.2420413

Publication date:
2024

Document Version
Publisher's PDF, also known as Version of record

Taylor & Francis
Taylor & Francis Group

Sustainability: Science, Practice and Policy

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tsus20

Heating practices during the energy crisis of 2022: the role of energy vulnerability and environmental concern

Kirsten Gram-Hanssen, Line Valdorff Madsen, Line Kryger Aagaard & Rikke Skovgaard Nielsen

To cite this article: Kirsten Gram-Hanssen, Line Valdorff Madsen, Line Kryger Aagaard & Rikke Skovgaard Nielsen (2024) Heating practices during the energy crisis of 2022: the role of energy vulnerability and environmental concern, Sustainability: Science, Practice and Policy, 20:1, 2420413, DOI: 10.1080/15487733.2024.2420413

To link to this article: https://doi.org/10.1080/15487733.2024.2420413

SUSTAINABILITY: SCIENCE, PRACTICE AND POLICY
2024, VOL. 20, NO. 1, 2420413
https://doi.org/10.1080/15487733.2024.2420413

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS Check for updates

Heating practices during the energy crisis of 2022: the role of energy vulnerability and environmental concern

Kirsten Gram-Hanssen, Line Valdorff Madsen, Line Kryger Aagaard and Rikke Skovgaard Nielsen

Department of the Built Environment, Aalborg University, Copenhagen, Denmark

ABSTRACT

Over the years, energy research in wealthy countries has shown that energy consumption happens unconsciously in connection with everyday routines, and most people—at least in the relatively prosperous and equal society of Denmark—are not aware of the price of energy. During the energy crisis of 2022 this was no longer the case, and new research questions were raised, including how do increasing energy prices and public awareness of the energy crisis affect heating practices in different types of homes and how do people cope with the new situation in practice? A qualitative study including interviews with 30 households from varying socioeconomic circumstances forms the background of the analysis. The research investigates similarities and differences in coping strategies and meanings related to changes in everyday practices, discussing whether changes carry different meanings according to energy vulnerability and environmental concern. The analysis is based on practice theoretical understandings and this article provides insights into how practice change and variations in practices following a crisis can be interpreted. The conclusion discusses the implications of the findings for the green transition.

ARTICLE HISTORY
Received 29 November 2023
Accepted 19 October 2024

KEYWORDS
Energy crisis; heating, comfort; practice change; energy vulnerability

Introduction

Due to global climate change, considerable reductions in carbon-dioxide (CO_2) emissions—and thus in energy consumption—are needed in the Western world, where heating homes is one of the main sources of greenhouse-gas emissions (Ivanova et al. 2017). There has long been substantial interest in promoting technical energy efficiency in buildings, and European policies have specifically focused on this objective through energy labels and energy standards for all new buildings (European Commission 2010). However, social science research has argued that reductions in energy consumption will not be achieved without understanding and changing comfort practices and norms of what people consider to be comfortable (Gram-Hanssen 2010; Madsen 2018b; Sahakian, Rau, and Wallenborn 2020; Shove 2003). Rather than only focusing on energy efficiency, policy must also consider questions of sufficiency by, for example, relating to the number of square meters heated per person (Ellsworth-Krebs 2019) and the temperatures to which they are heated (Sahakian, Rau, and Wallenborn 2020)

Social science research on heating homes and energy consumption has established that heating-related practices such as turning radiators up and down, using blankets, or putting on a jumper are habitual rather than conscious (Gram-Hanssen 2010; Hansen 2018; Shove 2003). Research has also demonstrated that social relations play a role in shaping energy demand (Hargreaves and Middlemiss 2020), with status and stigma helping to build a picture of what is considered normal in relation to energy consumption, heating, and comfort (Day and Hitchings 2011; Sahakian 2018). However, researchers have also been interested in how normality may be challenged by crises or other types of disruption to the energy systems or to broader sudden changes in society. Power blackouts, where the electricity supply is interrupted for a period of time, have been studied in relation to how prepared people cope with such situations (Heidenstrøm and Kvarnlöf 2018). Researchers have also studied blackouts to understand how people's everyday practices can point toward sustainable solutions from the context of their everyday experiences (Rinkinen 2013) and more generally how

CONTACT Kirsten Gram-Hanssen kgh@build.aau.dk Department of the Built Environment, Aalborg University. A. C. Meyers Vænge 15, 2450 Copenhagen, Denmark

Supplemental data for this article can be accessed online at https://doi.org/10.1080/15487733.2024.2420413.

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

blackouts may be seen as "experimenting with what we really need and can do without when it comes to electricity consumption" (Wallenborn and Wilhite 2014, 62). Rather than seeing disruptions only as problems to overcome, researchers such as Chappels and Trentmann (2018) frame them as a chance to learn about a new normality, and Greene and coauthors (2022) show that disruptions illustrate how practice arrangements work together, are formed, and change.

Challenging existing practices can be done deliberately, as in a European project that challenged people in different countries to turn down their indoor temperatures to 18°C (64°F) and then tracked whether and how they changed their norms and practices related to heating their homes (Sahakian et al. 2021; Sahakian, Rau, and Wallenborn 2020). The research showed that people managed to lower the temperature by changing practices such as putting on extra layers of clothing and blankets and drinking hot beverages, and thus slightly changed norms associated with acceptance of lower indoor temperatures. The research showed that many people adapted to the lower temperature, but that some had technical difficulties in managing their heating system. Follow-up studies revealed that some practice change was maintained after five years (Matschoss, Laakso, and Heiskanen 2024)

In 2022, Europe experienced an energy crisis with a gas shortage accompanied by sharply rising prices. This was a hot topic in Danish media, as in many other countries, and Danish authorities announced a potential crisis in securing energy supply. Energy, which had previously been taken for granted as an invisible part of everyday life, suddenly became a theme to discuss and worry about in public. This article explores the energy crisis in the Danish context. Denmark has a long tradition of heat planning, with the country divided into areas covered by district heating, natural gas, and other heating types, including oil and pellet stoves. This planning has resulted in most households (approximately 65%) being heated by district heating, while only about 15% rely on natural gas (Energistyrelsen 2021). During the energy crisis, gas prices increased considerably and electricity prices also increased to some degree, while the price of most district heating in Denmark did not rise substantially. This situation implies that some households were significantly affected by both gas and electricity price rises, and others only by rising electricity prices related to appliances and light. Compared to other European countries, Denmark has a relatively low level of energy vulnerability (Bouzarovski 2014), partly because many at-risk households live in social housing with reasonably high building standards and residences are heated by relatively inexpensive district heating. However, when considering the general increase in prices during the crisis, issues of energy vulnerability in Denmark may also have changed during this period. This article uses the concept of energy vulnerability rather than energy or fuel poverty to broaden understanding of households' situations beyond housing characteristics, household income, and energy prices, to also include infrastructure, tenure, and social norms (Bouzarovski and Petrova 2015; Middlemiss and Gillard 2015)

The purpose of this article is to describe how energy crises affect different types of households and their heating practices. Based on a practice theoretical approach, the aim was to answer the question of whether changes carry different meanings in different types of households, specifically in terms of issues of energy vulnerability and expressed environmental concern. The following section will present our theoretical approach to elucidate what we mean when talking about disruptions and everyday practices. We will then describe the methods used in the study before moving on to the analysis. The concluding section discusses the extent to which the energy crisis brought about practice changes toward a green transition.

Theory

The analytical framework for the data collection and analysis is practice theory, as first formulated by Schatzki (1996) and later developed and used in relation to sustainable consumption by several authors, including Shove, Pantzar, and Watson (2012) and Warde (2005). From this understanding, collective practices are at the center of understanding the social, where sayings and doings are held together by various elements including materiality, competencies, norms, rules, and meanings named and used in slightly different ways by different authors (Gram-Hanssen 2011). Practices are carried out as routines, often unconsciously, and different practices connect and depend on each other in time and space, thus constituting our ongoing and recurring everyday lives (Shove, Pantzar, and Watson 2012; Warde 2013). However, practices also change. For instance, people today do not heat their homes in the same way as they did 20, 50 or 100 years ago, due to new types of heating installations, housing types and infrastructures, and related changes in comfort norms (Madsen 2018b; Shove 2003). One way to understand changes in practice is that they happen when the elements holding the practices together change (Shove, Pantzar, and Watson 2012).

For instance, if new technologies or meanings become widespread, this would imply not only a change in the technologies or meanings themselves, but also in the practices associated with these elements. Keeping warm during the winter includes several related practices, such as regulating the temperature of heating systems, putting on more clothes, or using blankets (Madsen 2018a; Sahakian, Rau, and Wallenborn 2020), and we use the term heating practices to cover all these situations.

Practice theory is not a unified theoretical approach and one of the aspects on which authors differ is the interest in variations in practices. Shove and Walker (2014) in particular argued against focusing on differences in the performance of practices, whereas Warde (2005, 2013) was explicitly interested in such variation, which can be relevant when studying the dynamics of practices as well as inequality (Gram-Hanssen 2021). We are interested in variations in the performance of heating practices, including variations in the meanings associated with these practices, related specifically to environmental concern and financial stress. Following recent practice theoretical approaches, environmental concern is interpreted as general understandings that may play a role in shaping changes in everyday practices (Gram-Hanssen 2021). From a practice theoretical perspective, energy prices can be interpreted as meanings conveyed to households (Christensen et al. 2020; Strengers 2019), however, in cases where households are limited in their everyday practices by lack of financial resources, we propose rather to interpret this as a lack of materiel resources (e.g., a lack of energy or ability to pay for energy) constituting a situation of energy vulnerability.

Spurling and coauthors (2013) suggested that using theories of practice to deliberately steer practice change in a more sustainable direction can be achieved by recrafting practices (i.e., changing the elements of the practices) by substituting practices or changing how different practices intertwine. In relation to heating comfort, recrafting practices can include changes in the materiality and meanings of heating the home, while substituting practices could include keeping the body warm using extra layers of clothing rather than ambient heat. Changing how practices intertwine in relation to comfort and heating homes might involve completely rethinking what a home is, including what practices (e.g., cooking, eating, socializing, and sleeping) are performed at home, or in which parts of the home, thus calling into question ideas and norms of both home and comfort (Madsen 2018b)

Deliberately seeking to change practices from a practice theoretical perspective may, however, be different from what happens during a crisis. Understanding disruptions and crises within theories of practice includes understanding the temporalities of practices and their quotidian rhythms, where disruptions can be either short term (i.e., a few hours) or longer term, where a new permanent situation develops (Chappells and Trentmann 2018). Rather than seeing disruptions as abnormalities, Trentmann (2009) suggests viewing them as part of normality, as they are not becoming less prevalent in modern societies. On the contrary, more interconnected systems and tightly packed daily lives mean that disruptions might happen more often, and their impact may be stronger.

When analyzing crises and disruptions, it is relevant to elaborate on how practice theory can help us understand how crises affect practices, both temporarily and in the long term. During an infrastructural breakdown like a blackout, there is an immediate change in the material arrangements holding practices together, and thus practices cannot be performed in the same way as before. During an energy crisis, with sharply rising prices and a fear of possible blackouts, the meanings and understandings related to energy change, though for some households the rising prices also act as a physical-material limitation in the amount of energy that can be purchased due to financial constraints. Practices of consuming energy for heating thus change, including the doings, saying, meanings, rules, and understandings, as well as bodily awareness. However, material possessions, meanings and know-how are not equally distributed in society and therefore practice changes also vary among households according to, for example, differences in financial situations (Gram-Hanssen 2021; Warde 2005).

Methods

We carried out a qualitative study including interviews with 30 households between November 2022 and February 2023 (the coldest months of the year in Denmark). The focus was on households experiencing the highest price increases, and we therefore mainly recruited from areas without district heating, which are instead supplied by gas or electricity. These areas were found in smaller provincial towns and the countryside on Zealand. Most of the interviewees (19) relied on gas for heating, while others had recently changed their heating source from gas to heat pumps, thus relying on electricity. We sought to include different types of households to ensure social variation in relation to economic resources, demographics, and housing type. We also wanted to include households that were explicitly

interested in environmental issues as well as those that were not.

To ensure this variation, we used different recruitment strategies, including posts in various Facebook groups. Some targeted a green and energy-interested segment and others sought to engage people with little economic surplus. The latter included groups for giving away things for free and local groups aiming to prevent food waste by distributing leftover food. In these posts, we explicitly asked for respondents who were challenged by rising energy prices. We also selected specific geographic locations that we knew were heated by gas and had less expensive housing and approached these people via telephone numbers found online and in the car park of a local discount supermarket. We approached some interviewees at social dining events in a deprived social housing area to request an interview, and one respondent was recruited at a language school for immigrants.[1] Finally, we also used our personal network to invite interviewees to participate. All respondents were given a choice of either a box of chocolates or a gift card for two cinema tickets as an incentive for taking part in the interview. This gift was a strong incentive for some of the interviewees to participate in the study. University regulations prevented us from offering other types of gifts or compensation, which may have been more useful for some respondents who were under economic pressure from both the energy crisis and the cost-of-living crisis. All interviewees signed an informed consent form before the session in accordance with ethical research practices and the European Union's General Data Protection Regulation (GDPR). Table 1 presents an overview of all respondents.

To summarize according to the demographics and housing type, the final sample included nine households with pensioners (national average: 22% of adult population), 11 households with children (national average: 28%) and nine one-person households (national average: 40%). Furthermore, it included eight households in social housing (national average: 17%), three households that were renting privately (national average: 18%), and 16 households in owner-occupied detached housing (national average: 44%). Our strategy was to achieve variation in the sample rather than it being representative of the population. Comparing our sample to national statistics from Statistics Denmark as above is therefore not an attempt to show representativity, but rather to show that our sample includes relevant variation in housing and demographic parameters.

The semi-structured interviews were conducted by one or two of the first three authors of this article. The interviews were primarily carried out in the respondents' homes and included home tours and photographic documentation of the objects and technologies that were discussed over the 1–2 hours that the interviews lasted. Deviations to this protocol included two interviews conducted via telephone and one carried out at a language school (as indicated in Table 1), in accordance with the respondents' preferences. These three sessions were slightly shorter. Interviews followed an interview guide including questions on background information, energy consumption and reductions, comfort, issues related to the building's materiality, social relations, and energy vulnerability, as well as interest in environmental issues (see interview guide in Appendix A). Interviews also included questions on electricity use for appliances, though this article only focuses on the energy used for heating purposes. All interviews were transcribed and coded in Nvivo. The coding was performed by the first two and last authors and builds on the research questions of the study in combination with theoretical understandings of everyday practices and the content of the interviews. All 30 interviews are included in the analysis, despite only a small sample being quoted in the next section.

Analysis

The analysis addresses how different interviewees were affected by and reacted to the energy crisis to elucidate whether the same practice change carries different meanings in different types of households. The analysis is structured as a balance between letting the empirical material speak and following the previously described research questions. This approach resulted in the following four subsections that focus on (1) reacting to the crisis for different reasons; (2) lowering temperatures to different degrees in different rooms; (3) the importance of materiality in heating practices; (4) comfort norms, including caring for oneself and others.

Reacting to the crisis for different reasons

There were different narratives of how, when, and why people reacted to the crisis, but it most often included issues of rising prices, either when they were announced ahead of the crisis, or when they actually happened. For Lily, it was a combination of news of the Russian invasion of Ukraine and the bill from the gas company that prompted her decision to first turn off the gas for room heating and later to turn it off for hot water as well. When asked about the timings, Lily answered:

Table 1. Overview of interviewees.

Number	Interviewee (pseudonym)	Housing type	Heating technology	Occupation	Household	Recruitment
1	Max and Anne	Terraced SH	Gas	Retired	2 adults	Area-based phone call
2	Elisa	Terraced SH	Gas	Retired	1 adult	Area-based phone call
3	Camilla	Terraced SH	Gas	Homecare, children with a diagnosis	1 adult, 2 children	Through other interviewee
4 Phone	Marie	Detached OO	Gas	M in work W not in work (by choice)	2 adults	Local supermarket
5 Phone	Mette	Terraced SH	Gas	On social benefits	1 adult	Area-based phone call
6	Amelia	Terraced PR	HP	In work	1 adult	Personal network
7	Amy	Apartment SH	Gas	W on social benefits M in work	2 adults, 3 children	Café in social housing area
8 School	Muhammed	Apartment SH	Gas	In work	2 adults, 2 children	Language school
9	Connie	Terraced PR	Gas	Retired	1 adult	Personal network
10	Ella and Tom	Detached OO	Gas and wood stove	Retired	2 adults 1 child	Personal network
11	George and Vita	Detached OO	HP and gas	Retired	2 adults	Personal network
12	Sarah	Terraced SH	HP and electricity	On social benefits	1 adult	Facebook group for free items
13	Tara	Terraced PR	Electricity	On social benefits	1 adult	Facebook group for preventing food waste
14	Harry	Apartment SH	Gas	Retired	1 adult	Café in social housing area
15	Lily	Detached OO	Gas/ stove	On social benefits	1 adult, 2 children	Facebook group for preventing food waste
16	Vanessa	Detached OO	Gas	M in work W on parental leave	2 adults, 2 children	Facebook group for preventing food waste
17	Betty and Martin	Detached OO	Pellet stove	W in part-time work M on social benefits	2 adults	Facebook group for preventing food waste
18	Caroline	Detached OO	Oil-fired heating	In work	1 adult, 1 child	Personal network
19	Kent	Apartment OO	Gas	On social benefits	1 adult	Personal network
20	Joe and Rachel	Detached OO	HP	2 in work	2 adults, 3 children	Facebook group for green electricity
21	Nina and Jimmy	Detached OO	Electricity +HP	2 in work	2 adults, 2 children	Facebook group for green electricity
22	John and Elsa	Terraced OO	District heating	2 in work	2 adults 3 children	Facebook group for green electricity
23	Brian and Helen	Detached OO	Gas	M in work, W retired	2 adults	Facebook group for green electricity
24	Michael and Barbara	Detached OO	HP	2 in work	2 adults, 1 child	Facebook group for green electricity
25	Oscar and Roberta	Detached OO	Gas	2 retired	2 adults	Facebook group for green electricity
26	Sebastian and Tina	Detached OO	Solar heat + HP	2 in work	2 adults	Facebook group for green electricity
27	Dora and Josef	Allotment OO	District heating	2 retired	2 adults	Facebook group for minimalism
28	Maggie and Charles	Detached OO	Gas, just changed to HP	2 retired	2 adults	Facebook group for green electricity
29	Alex and Heidi	Detached OO	Gas	M in work, W on social benefits	2 adults, 1 child	Facebook group for green electricity
30	Vincent	Detached OO	Gas	2 in work	2 adults, 2 children	Facebook group for green electricity

Abbreviations: HP: heat pump; SH: social housing; PR: private rent; OO: owner occupied.
Note. The adults who participated in the interviews have been given pseudonyms.

Lily: It was turned off in February. When Putin went in.

Interviewer: A year ago?

Lily: Yes, when he decided he was going to invade Ukraine, and then they said that now the gas price is going to [go up]. I went straight out and turned it off.

Interviewer: So it was just that you heard in the media that gas prices would rise, or you saw the news?

> Lily: I actually chose to…and it was a bit stupid, because it was actually the whole summer… I chose to keep the hot water, so it ran until the beginning of September. Then I knew I had only used hot water. I hadn't had any heat on or anything. Then I got a bill of almost 4,000 DKK [US$600]. Then I thought it would cost me DKK 20 [US$3] to take a shower in the municipal swimming pool. I can take lots of showers [for that amount]…It's a quarterly bill, but still… (Interview 15)

For Lily and other households expressing financial stress (3, 5, 6, 7, 11, 12, 13, 15, 18), reacting to the crisis was certainly a question of finances. Lily could not afford the rising prices and decided to turn off the gas in September when she saw her bill, and when we interviewed her the following January, she and her two teenage sons had not had any hot water in the house for several months, and all their heating came from a wood burning stove, with wood that they received for free, supplemented by heating from candlelight. Other households expressed that while they did not have any financial problems related to paying the rising bills, the increasing prices made them think more about their consumption for environmental reasons, even though they were already environmentally concerned before the crisis (10, 20, 21, 22, 24, 25, 27, 28, 29). The crisis for them added to an existing concern related to the environment and climate, as expressed here by Michael:

> Interviewer: Is it because of the prices or is it also a climate-related concern?
>
> Michael: It's both. For us, it goes hand in hand – the climate-related and the financial. We had begun to do some things before [the energy crisis]. We always thought about these things, now we're just thinking even more about them. (Interview 24)

Only one of our interviewees, Elisa (2), an older pensioner living in terraced social housing, did not really react to the rising prices or news, as neither her financial situation nor environmental awareness caused her any concern.

Together these three respondents illustrate the variation from hardly noticing the crisis to taking the drastic decision to turn off their gas boiler, mainly due to financial concerns, while another interviewee changed a number of different practices based on a combination of rising prices and environmental concern. Following this variation, Figure 1 shows all 30 respondents on two different axes, one showing to what degree they expressed environmental concern and the other axis to what degree they experienced financial stress related to the energy crisis. This ordering is based on a qualitative interview analysis, including but not limited to direct expressions by interviewees, under codes of environmental concern and economic stress. This ordering of interviewees demonstrated that those who made the largest number of changes to their practices were those either expressing high financial stress or high environmental concern. This connection will be illustrated in the following sections, and we will return to this observation in the discussion.

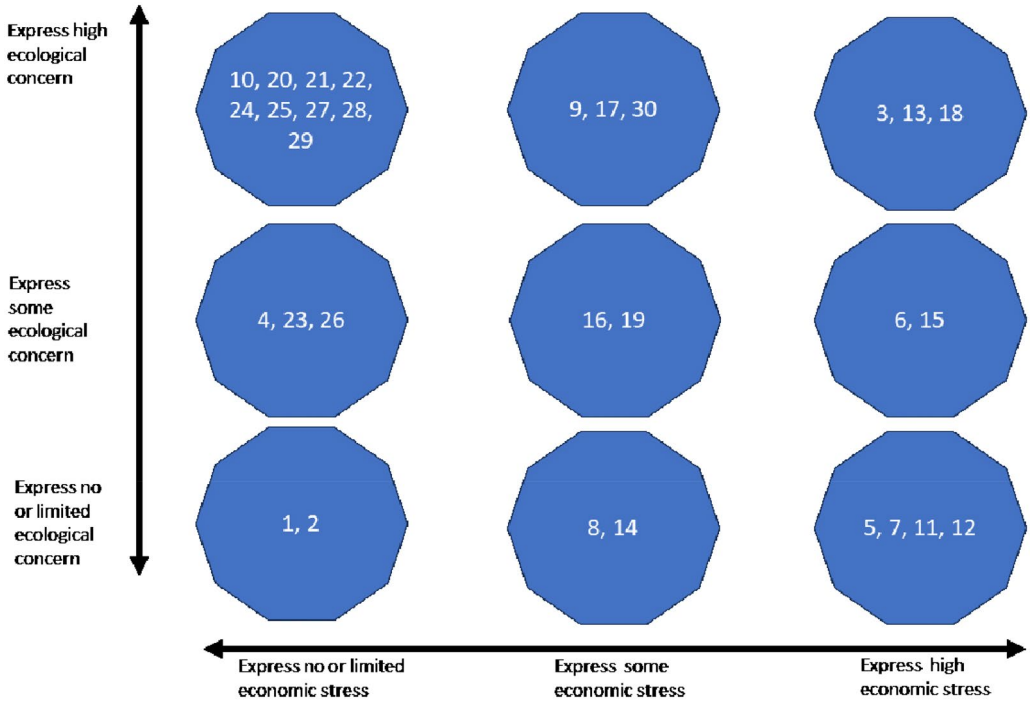

Figure 1. Interviewees ordered according to their own expression of environmental concern and their feeling of financial stress related to rising prices.

Note. Interviewees who did not express financial stress are not necessarily affluent, but they did not indicate that the rising energy expenditure put a strain on their budget.

Lowering temperatures to different degrees in different rooms

In terms of actual changes in practice, lowering the temperature in all or some rooms, or at certain times of the day, was common practice, as seen in the following extract.

> Kent: I've turned it down to 19[°C] [66°F].
>
> Interviewer: So you've turned it down?
>
> Kent: Yeah, because I think before it was more like 21[°C] [70°F], right? I've never been someone who needed it to be very hot, but I'm turning it down a few degrees…And then I also think about it a bit – I'm not always good at it – but if I know I'm going to be out most of the day, I'll turn down the radiator a bit. But then again, I'm not fanatical about it, but if I remember, I will tend to do it. (Interview 19)

The strategies related to lowering heating costs included turning down the temperature one or more degrees (people often talked about reducing it to 19°C (66°F) and lowering when not at home, as expressed here by Kent. Furthermore, several households, especially those living in bigger houses, used the strategy of heating only part of the home, part of the time. Lowering the temperature in some rooms at certain times may involve new routines of operating the heating. This can be done using smart technology to control the temperature and some of our interviewees were quite keen on this approach, especially those recruited through a Facebook group related to "green electricity" and mostly the male respondents in these households. For instance, Brian enthusiastically explained about his new smart system for heat control, which he had just installed:

> Brian: [The smart heating system] lowers the temperature every evening at 10 o'clock. So I programmed it according to the clock. The [heating in the] office comes on, and I say that I want it to be warm at 9 o'clock. So [which rooms of the house] do we want to be in at what time? (Interview 23)

Other interviewees controlled their heating manually as explained here by George, who only heated the bedroom during the night and the living room during the day, while other areas remained unheated:

> George: We have heat in the living room and then at night we turn on the heat in the bedroom, which is just upstairs.
>
> Interviewer: And then everything else is switched off?
>
> George: …and then we switch off the heat pump, but we [did not know] whether it was a good idea, because then you have to use a little more energy in the morning and that is when it is most expensive. So maybe it's better not to switch off the heat pump at night, but it's also hard to know. (Interview 11)

As illustrated here, some respondents who regularly turned the heating up and down were not entirely sure if it was the best way to save money and energy. Competency and knowledge on this specific question thus seemed to be lacking in some households. For many interviewees, including George, there was also a concern that lowering the temperature too much could lead to problems with mold. George bought hygrometers for all the rooms in his house and investigated whether or not there were issues with high humidity in the unheated rooms. At the time of the interview, he had not identified any problems, as they kept the doors closed and did not use these rooms. For others, the issue of mold was an argument for not lowering the temperature too much. John, who was explicitly concerned about the environment and having a low-consumption lifestyle in general, said that his household had lowered the temperature from 20°C to 19°C (68°F to 66°C) in all their rooms due to the energy crisis, but that they would not go lower than that:

> Interviewer: Why don't you dare turn off the heat?
>
> John: Because we are afraid that the house will be too cold if we are not here. If we are out of the house and it's empty.
>
> Interviewer: You don't turn down the heat at all if you leave?
>
> John: No, the dew point is just around 18°C [64.5°F], so…if the house gets colder than 18°C, then there is a risk of moisture. So, I don't turn it down from 19°C [66°F] to 18°C. (Interview 22)

Turning off the heat in some of the rooms could also involve changing which rooms are used for what activities, and perhaps rearranging the furniture. Vincent convinced his wife that they should stop using their living room for the rest of the winter, and move the sofa and television to the kitchen-dining room so they would only have to heat this room:

> Vincent: Then we can move into the dining room next door. There are two double doors so we can move a couple of sofas in. It's a fairly large dining room. So down here in the dark corner…you could put two sofas in there and a television here and then take out the large dining table…My wife is not totally crazy about the idea.
>
> Interviewer: Can you try to tell me what she says about it?
>
> Vincent: Yes, she thinks on paper it's a very good idea [to close things off] because she can see the

> bills are expensive and things like that. But when you actually come to do it…In other words, experiencing it yourself, then it is as if it's not so…Then it's easier not to bother. But she nodded and said it's OK.
>
> Interviewer: So it will happen?
>
> Vincent: It's going to happen now. (Interview 30)

It was common in all interviewed households to lower the temperature in some or all rooms, or at certain times during the day, though to differing degrees. The goal was often 19°C (66°F), though some respondents also found this to be too cold. Knowledge of and rules related to the dew point and mold were mentioned in several interviews as a concern if the temperature remained below 19°C. Some of the households with bigger houses also had the opportunity to heat only certain parts of the home, and to completely turn off the heating in other parts, or keep the temperature very low. All of the households that completely turned off the heating in part of the house expressed either high financial stress (11, 15, 18) or high ecological concern (10, 17, 18, 21, 30) or both (18). In these cases, the interviewees prioritized heating the dining room and the bedrooms, while additional living rooms, guest rooms, offices, entrances, corridor areas, and utility rooms were left unheated and unused in some cases. These households thus performed a spatial rearrangement of their practices. In some of the most financially stressed households, the kitchen and/or bathroom were not heated either, though they were still used (11, 15, 18).

Importance of the materiality of space-heating practice

The question of lowering temperatures related to how easy it was to manage the heating due to the materiality of the home. This could involve issues of underfloor heating being very slow to react to changes made due to the heavy concrete under the floor, as some interviewees mentioned, or it could relate to installations being too old, as Vanessa indicated.

> Vanessa: Here we have [her son's] room and here are the old thermostats. And it's just…good luck with how you turn them up.
>
> Interviewer: So, you can't know what…
>
> Vanessa: If you sit at night [nursing the boy], you may end up turning it up way too much, and then it's a hundred degrees in here and then you turn it off, and then [it's cold again] in here. And we simply cannot change them because we cannot put them on a smart thermostat. Or the smart ones don't fit. So, if we have to change them, we have to change all the radiators, or have a plumber come out to take all the water out and screw new plugs on. And that's not going to happen [laughs]. (Interview 16)

The materiality of heating also includes renovating and insulating the houses. Some interviewees lived in houses where they had already done this prior to the crisis. For others, the crisis became an incentive to achieve even more. For those living in rented properties (3, 5, 7, 9), or in owner-occupied housing but without the finances to do any retrofitting (11, 15, 18), ad-hoc and cheap solutions also came into play. Several respondents explained that they had become more aware of how curtains and blinds helped in keeping out the cold. One interviewee, Mette, explained how she had insulated her living room with a yoga mat:

> Mette: The wall facing the garden is where I cut a yoga mat to keep the heat in.
>
> Interviewer: So you put it up the wall itself?
>
> Mette: Yes…Because there isn't much insulation in that wooden wall there. So that's the way I've tried to solve it. (Interview 5)

The provision of heat was also a very important part of the materiality of heating practices. As mentioned in the methods section, we prioritized interviewing households with gas heating, as this form of heating saw the most dramatic price increases. Again, for those living in owner-occupied housing and with the financial means, the change to heat pumps was a fairly easy choice, with the only problem being that they had to wait for the contractor to install the system. For many, an existing wood-burning stove also became part of the solution to the rising prices. One thing that surprised us, however, was the widespread and systematic use of candlelight in heating practices in some of the households experiencing the most financial limitations (7, 12, 15). Amy explained how they did not turn up the heating, even when they felt very cold:

> Amy: No, we don't do that, we just light some candles. And if it's a little colder, you light a few more candles [laughs].
>
> Interviewer: How many candles can be lit in here?
>
> Amy: We actually mostly put them on the aquarium. Now there are just a few, then we put a few more up there, and then it actually gets pretty warm in here pretty quickly.
>
> Interviewer: So, three to four candles up there…?
>
> Amy: Seven or eight tealights and two pillar candles or something like that.

Interviewer: Yes okay, so ten candles?

Amy: Yes, something like that…

Interviewer: Then it's more for the warmth than for the sake of coziness?

Amy: Yes, because if it was just supposed to be nice, I would put them on the table.

Interviewer: Yes, that's what I thought.

Amy: Yes, so…we never really light candles unless it's because it's cold in here. (Interview 7)

Heating by candlelight could seem like an expensive solution. However, some households received the candles for free, and one (15) argued that buying candles was a form of prepayment, and thus less stressful financially compared to gas, which you use without knowing the final price.

The materiality of the house, including its level of energy efficiency and type of heating source, thus has a huge impact on what practice changes were possible for the householders. Tenure type and financial situation were crucial as well. It was not possible for those renting to improve the energy efficiency of the house and heating system as these decisions lie with the properties' owners or housing associations. It was also not possible for some of the owner occupiers to improve their houses or change heating installations due to limited capital.

Comfort norms—caring for oneself and others

Changes in indoor temperatures led to a need for other ways to keep warm and feel comfortable at home. Another practice change related to materiality that became apparent in almost all interviews was the more frequent use of slippers, jumpers, and blankets.

Ella: …as long as you can just put on an extra shirt and maybe slippers, which I have never done at lot before, then it's OK. But it was a bit cold at the beginning [getting used to it]…the prices were also so high so you thought: I would have to save more than what was appropriate. (Interview 10)

Ella and most other interviewees wore warm garments indoors more this winter than they had previously, and while Ella found this acceptable, others expressed concerns about it. Whether it feels appropriate to put on more warm clothes and turn down the heating can also relate to previous experiences of the cold, which may bring back bad memories. Amelia (6) talked about how she and her ex-husband lived with their two small children in a big house where there were many unfinished renovation projects, including heat provision and insulation. This meant that they lived for years in a very inefficient home with a system where they manually collected oil in cans, and often experienced waking up in a cold house during the night because the oil had run out. Amelia explained that feeling cold now brought back these unpleasant recollections.

Being able to tolerate lowering the temperature could also relate to experiences of the cold in other places. Several interviewees mentioned the policy in public buildings and workplaces during the winter of 2022–2023, when the government decided to turn down the heating to 19°C (66°F). Rachel explained:

Rachel: After all, I also sit in a public building and work. And there is no reason for me to get used to it being 23–25°C [73–77°F] [at home] when I come up to an office that is 19°C [66°F]. So we have to toughen up, I thought. So that's why I haven't switched on the heating yet. (Interview 20)

In addition to individual experiences of feeling cold, another important aspect was what interviewees found to be acceptable for others within the household. Many who had children at home referred to how their children should not suffer from feeling too cold. Some respondents also mentioned poor health—either their own or that of a family member—as a reason for not questioning comfort norms too much despite financial stress (5, 11, 13, 18). As an example of both aspects, Caroline explained how they moved around so her daughter had the only room that was easy to heat to a higher temperature. We asked if she ever questioned how much her teenage daughter turns up the heating in her room:

Caroline: No, not really and there are several reasons for that. The years we lived in [another Nordic country] and were really hit financially…We froze for several years, really froze. So I feel a bit like that…It's pure luxury she gets…And she actually has a disease, which is [description of condition]… So she's struggling a bit with this [condition] and medicine…So I feel a bit…

Interviewer: [Like] there shouldn't be too much else to bother her?

Caroline: No. We don't do much, we don't travel much. We don't do much other stuff. So I feel like that…It's her luxury. Having a warm room is not something we talk about, but I think: that's what I can give her. Then we must be cold everywhere else. (Interview 18)

Finally, those with pets also talked about how the pet's comfort affected their heating practices. For example, Betty and Martin (Interview 17), who breed cats, were very economical when it came to heating rooms for themselves, but when it came to their cats, they did not compromise on heat comfort. This meant that one room in the house was only heated

for the pregnant cat, so that she could give birth in a warm room. Many of the interviews reflected a willingness to compromise on the respondent's own comfort, whereas their care for other members of the household meant that the comfort of their pets, children, or infirm family members was more important than saving on heating expenses.

The meanings associated with maintaining lower temperatures were also expressed when we asked if people would like to keep the lower temperatures after the crisis, which some of them like Ella and Tom thought they would:

> Ella: I do believe that this thing with the 19 degrees [C] [66 degrees F], it will actually work out.
>
> Tom: Yes, that's also what I think.
>
> Ella: I thought: we can definitely live with that. And why should we heat more? When it is in fact…polluting. I mean, mostly it's about CO_2 and pollution and so on. (Interview 10)

For others like George and Vita, who had turned the temperature down, including keeping the kitchen and bathroom unheated due to financial stress, the experiences were much more negative, especially for Vita, who also had severe health issues:

> Vita: I take a deep breath before going up to the bathroom because that's really cold. And I do need to take a bath, but, oh my, then I have to stand there all bare first and it's too cold. That's the kind of practical worries that I have. (Interview 11)

Vita and George plan to turn up their heating if or when they have the financial means for it. Their bodily feelings related to maintaining lower temperatures were associated only with worry and discomfort, in contrast to others who talked about toughening up and letting the body grow accustomed to the decreased temperatures. Nevertheless, those who kept the lowest temperatures or had the largest number of unheated rooms did it because of financial necessity, whereas those acting mainly on environmental concerns had made less dramatic changes in their heating practices.

Discussion: do the same changes carry different meanings?

We consider the energy crisis as a disruption and study how it affected the everyday practices of households when heating their homes. Previously studied disruptions have focused on blackout situations, where the power is down and normal energy-consuming activities are prevented (Heidenstrøm and Kvarnlöf 2018; Rinkinen 2013; Trentmann 2009), and the COVID-19 lockdowns (Greene et al. 2022), when governmental restrictions prevented some activities. Other studies have involved issues of deliberative attempts to change practices (Sahakian et al. 2021). The energy crisis of 2022 was different in its form of disruption, as it included a major increase in prices alongside an appeal from authorities to lower consumption to prevent blackouts. It was thus not a disruption that immediately implied a physical or regulatory change in practices as with a blackout or lockdown. However, the analysis showed that considerable changes in practices occurred in most interviewed households.

Our sample of respondents varied according to expressed financial stress as well as manifest environmental concern. We are interested in the extent to which these two parameters affected the way practices were changed during the energy crisis. The analysis revealed significant changes in people's heating practices related to indoor temperatures, use of rooms, warm clothing, and alternative heating sources. This study revealed that all but one informant made changes in their heating practices, indicating that changing practices to save energy was a new norm rather than something related to stigma (Day and Hitchings 2011), as in the past. These changes in practices, however, varied with elements of holding heating practices together. Knowledge and competencies or a lack thereof (e.g., related to understanding the extent to which energy saving is achieved when the heating is turned off in unused rooms) affected practices. In addition, bodily memory (Maller and Strengers 2013) of different temperatures and the meanings associated with these recollections had an impact on what changes were performed and on what meanings were associated with them. Previous negative experiences of feeling cold were present in the body and affected present heating practices and the meanings associated with them. Another bodily-material element is the issue of health, which also formed the doings of the heating practices, for example how low temperatures could go when taking care of those with health issues—either oneself or family members. Other bodily experiences of lower temperatures related to the Danish government's decision to maintain a temperature of 19°C (66°F) in public workplaces during the crisis meant that some interviewees grew accustomed to this temperature and brought the practice home as well. The exact temperature mentioned in the interviews was also related to some extent to what could be seen as rules communicated by authorities and professionals. Many referred to 19°C (66°F), which was the official recommendation for public spaces, as well as to rules of temperature levels associated with avoiding mold in cold or humid

rooms. Both bodily understandings and official rules thus interacted in terms of how respondents challenged and changed comfort norms during the energy crisis of 2022. Finally, the materiality of the house and heating installations were clearly relevant, as also documented in previous practice theoretical studies (e.g., Hansen, Gram-Hanssen, and Knudsen 2018; Rinkinen and Jalas 2017)

Relating the practice changes to ideas from Spurling et al. (2013) shows that the changes were mainly about recrafting practices, including changes in materiality and meanings of heating the home, and about substituting practices through extra layers of clothing to keep the body warm rather than heating the room. More radical changes related to rethinking what a home might be and which practices it includes were only seen to a limited extent in cases where the household moved together to use and heat only one room, thus spatially rearranging practices inside the home, or in a case where the practice of showering was moved out of the home. Some interviewees also saw reduced living space—for instance a smaller home—as a potential long-term solution for reducing energy expenditures. There does not seem to be any strong relationship between issues of energy vulnerability and the extent to which practices are recrafted or substituted or changes are made to how practices intertwine, but rather it is the meanings associated with the changes that vary with energy vulnerability. However, one aspect is clearly linked to different financial situations and forms of ownership, and that is the opportunity to improve the energy efficiency of the home. This option was not available to all respondents, and many of those without this capability felt deprived, as it limited their options for long-term solutions to increasing energy prices. The use of alternative heating sources, such as candlelight, was clearly an option only used by those who were financially stressed, with possible health-related effects.

Whether the same practice change carried different meanings for different types of households can be illustrated by the practice change of turning down the heating. This was done in all interviewed households, including either lowering the overall temperature, reducing it down in a specific room or at certain times of the day. For some, turning down the heating was a voluntary way of contributing to limiting the energy crisis. For others, it was an absolute necessity. The experience of lowering the heating varied, with factors such as the materiality of the house, financial considerations, and forms of ownership (all of which also affected the opportunity to improve the energy efficiency of the home), as well as by previous negative experiences of inadequate indoor temperature and health issues. The adverse recollections related to turning down the heating, including financial stress and health issues, can be seen as aspects of energy vulnerability. Interviewees experiencing significant duress felt pressured to lower their heating, some to a much greater extent than they felt was appropriate or comfortable.

In contrast, the environmentally concerned households without economic strain experimented with the relationship between the materiality of their home and their sense of comfort (Madsen and Gram-Hanssen 2017), including how much they could turn down the heating without feeling too distressed, and using the rooms of their house in different ways. These ecologically aware households often had bigger and more efficient houses and expressed a sense of voluntary agency. Turning down the heating contributed to a feeling of doing good, while at the same time they also knew that they could turn it back up if it became too uncomfortable.

The meanings associated with changes in practices thus varied depending on whether the interviewees saw it as a choice or a necessity. Respondents who expressed environmental concern, whether financially stressed or not, also related their energy savings to something positive, at least in part. Having health issues had the opposite effect, resulting in decisions to keep temperatures up (in specific rooms) despite economic strain, as a way of caring for themselves, their family members, or pets. Finally, it is worth noting that those interviewees who felt pressured by their monetary situation, as shown in the analysis, often maintained lower temperatures (including unheated rooms) compared to those acting solely based on environmental concern.

Conclusion

This article analyzed 30 household interviews about comfort and changes in heating practices during the European energy crisis of 2022–2023. The analysis showed that many of the changes, such as lowering the temperature and putting on extra layers of clothing, were the same across respondents, but the meanings associated with these practice changes were quite different. For some interviewees it was a positive contribution to solving a broader problem of the environment and climate, while for others it was a disadvantage in an already difficult life situation. In all cases, the changes in practices were affected by variations in materialities, rules, bodily awareness, and competencies. Furthermore, previous comfort experiences affected practice change, which explains how prior sociotechnical arrangements

become embodied and thus contributed to forming new practice changes.

The question of how persistent the changes in practices will be and to what extent the changes will continue after the energy crisis is a question that can only be answered in years to come. However, the analysis does provide some suggestions of what can be expected. For households in difficult situations that made changes that were perceived as requiring substantial compromises in terms of comfort, the practice changes are likely to persist only as long as the prices are high. However, new practice routines might be maintained when compromises are felt to be acceptable, allowing for more financial flexibility when prices go down. For most of the environmentally concerned households, the energy crisis was an extra push to perform further minor adjustments and recraft practices, even though these households had also thought about environmental and climate issues before the crisis. Some of these adjustments in practices are likely to persist after the prices have fallen again. In addition, the energy crisis can be seen to have had a lasting impact on households where it initiated material changes in insulating the home or changing heat provision, for example, from gas to heat pumps.

Seen in this light, the energy crisis and associated increase in prices can thus also be used to discuss how rising energy prices as a climate-policy tool may affect energy-consumption practices. First, we can observe that escalating costs have very different consequences for different households. For some vulnerable households, the rising prices may involve enhanced disadvantages, which a Scandinavian welfare society such as Denmark is obligated to address. Second, the practice changes that followed the rising prices mainly included recrafting practices (e.g., lowering the temperature) and substituting practices (e.g., adding layers of clothing), whereas more persistent and effective changes, like questioning the amount of heated living space and what practices should be performed in homes, followed rising prices only to a very limited extent. It may be that such changes stem from the anticipation of a longer period of time with higher prices or higher prices becoming a new normal.

The energy crisis may thus have some lasting impact on the performance of practices, and this includes lessons for policy formulations. One insight is that public awareness, including the government's plea to lower consumption and the decision to reduce temperatures to 19°C (66°F) in public buildings, did have an immediate and widespread effect. Another lesson is that rising energy costs can be a tool for changing energy-consumption practices, though this instrument has social implications and may not support more radical changes in ways of living and consuming energy for comfort.

Note

1. A housing area on the national list of deprived areas published annually by the Danish Ministry of the Interior and Housing.

Data availability

Data are available at https://zenodo.org/records/13847672.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The work associated with this article is funded by European Research Council Advanced Grant No. 786643.

ORCID

Kirsten Gram-Hanssen http://orcid.org/0000-0002-8543-2501
Line Valdorff Madsen http://orcid.org/0000-0003-0861-0041
Line Kryger Aagaard http://orcid.org/0000-0003-2701-1335
Rikke Skovgaard Nielsen http://orcid.org/0000-0003-0308-1275

References

European Commission. 2010. *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the Energy Performance of Buildings (Recast)*. Brussels: European Commission. http://data.europa.eu/eli/dir/2010/31/oj

Bouzarovski, S. 2014. "Energy Poverty in the European Union: Landscapes of Vulnerability." *WIREs Energy and Environment* 3 (3): 276–289. doi:10.1002/wene.89.

Bouzarovski, S., and S. Petrova. 2015. "A Global Perspective on Domestic Energy Deprivation: Overcoming the Energy Poverty-Fuel Poverty Binary." *Energy Research & Social Science* 10: 31–40. doi:10.1016/j.erss.2015.06.007.

Chappells, H., and F. Trentmann . 2018. "Disruption in and across Time." In *Infrastructures in Practice*, edited by E. Shove and F. Trentmann, 197–209. London: Routledge. doi:10.4324/9781351106177-20.

Christensen, T., F. Friis, S. Bettin, W. Throndsen, M. Ornetzeder, T. Skjølsvold, and M. Ryghaug. 2020. "The Role of Competences, Engagement, and Devices in Configuring the Impact of Prices in Energy Demand Response: Findings from Three Smart Energy Pilots with Households." *Energy Policy* 137: 111142. doi:10.1016/j.enpol.2019.111142.

Day, R., and R. Hitchings. 2011. "'Only Old Ladies Would Do That': Age Stigma and Older People's Strategies for Dealing with Winter Cold." *Health & Place* 17 (4): 885–894. doi:10.1016/j.healthplace.2011.04.011.

Ellsworth-Krebs, K. 2019. "Implications of Declining Household Sizes and Expectations of Home Comfort for Domestic Energy Demand." *Nature Energy* 5 (1): 20–25. doi:10.1038/s41560-019-0512-1.

Energistyrelsen. 2021. Energistatistik 2020: Data, Tabeller, Statistikker og Kort (Energy Statistics 2020: Data, Tables, Statistics and Maps). Copenhagen: Energistyrelsen. https://ens.dk/sites/ens.dk/files/statistik/energistatistik_2022.pdf

Gram-Hanssen, K. 2010. "Residential Heat Comfort Practices: Understanding Users." *Building Research & Information* 38 (2): 175–186. doi:10.1080/09613210903541527.

Gram-Hanssen, K. 2011. "Understanding Change and Continuity in Residential Energy Consumption." *Journal of Consumer Culture* 11 (1): 61–78. doi:10.1177/1469540510391725.

Gram-Hanssen, K. 2021. "Conceptualising Ethical Consumption Within Theories of Practice." *Journal of Consumer Culture* 21 (3): 432–449. doi:10.1177/14695405211013956.

Greene, M., A. Hansen, C. Hoolohan, E. Süßbauer, and L. Domaneschi. 2022. "Consumption and Shifting Temporalities of Daily Life in Times of Disruption: Undoing and Reassembling Household Practices During the COVID-19 Pandemic." *Sustainability: Science, Practice and Policy* 18 (1): 215–230. doi:10.1080/15487733.2022.2037903.

Hansen, A. 2018. "'Sticky' Energy Practices: The Impact of Childhood and Early Adulthood Experience on Later Energy Consumption Practices." *Energy Research & Social Science* 46: 125–139. doi:10.1016/j.erss.2018.06.013.

Hansen, A., K. Gram-Hanssen, and H. Knudsen. 2018. "How Building Design and Technologies Influence Heat-Related Habits." *Building Research & Information* 46 (1): 83–98. doi:10.1080/09613218.2017.1335477.

Hargreaves, T., and L. Middlemiss. 2020. "The Importance of Social Relations in Shaping Energy Demand." *Nature Energy* 5 (3): 195–201. doi:10.1038/s41560-020-0553-5.

Heidenstrøm, N., and L. Kvarnlöf. 2018. "Coping with Blackouts: A Practice Theory Approach to Household Preparedness." *Journal of Contingencies and Crisis Management* 26 (2): 272–282. doi:10.1111/1468-5973.12191.

Ivanova, D., G. Vita, K. Steen-Olsen, K. Stadler, P. Melo, R. Wood, and E. Hertwich. 2017. "Mapping the Carbon Footprint of EU Regions." *Environmental Research Letters* 12 (5): 054013. doi:10.1088/1748-9326/aa6da9.

Madsen, L. 2018a. "Materialities Shape Practices and Notions of Comfort in Everyday Life." *Building Research & Information* 46 (1): 71–82. doi:10.1080/09613218.2017.1326230.

Madsen, L. 2018b. "The Comfortable Home and Energy Consumption." *Housing, Theory and Society* 35 (3): 329–352. doi:10.1080/14036096.2017.1348390.

Madsen, L., and K. Gram-Hanssen. 2017. "Understanding Comfort and Senses in Social Practice Theory: Insights from a Danish Field Study." *Energy Research & Social Science* 29 (Supp. C): 86–94. doi:10.1016/j.erss.2017.05.013.

Maller, C., and Y. Strengers. 2013. "The Global Migration of Everyday Life: Investigating the Practice Memories of Australian Migrants." *Geoforum* 44: 243–252. doi:10.1016/j.geoforum.2012.09.002.

Matschoss, K., S. Laakso, and E. Heiskanen. 2024. "What Can We Say About the Longer-Term Impacts of a Living Lab Experiment to Save Energy at Home?" *Energy Efficiency* 17 (5): 50. doi:10.1007/s12053-024-10231-y.

Middlemiss, L., and R. Gillard. 2015. "Fuel Poverty from the Bottom-Up: Characterising Household Energy Vulnerability through the Lived Experience of the Fuel Poor." *Energy Research & Social Science* 6: 146–154. doi:10.1016/j.erss.2015.02.001.

Rinkinen, J. 2013. "Electricity Blackouts and Hybrid Systems of Provision: Users and the 'Reflective Practice'." *Energy, Sustainability and Society* 3 (1): 25. doi:10.1186/2192-0567-3-25.

Rinkinen, J., and M. Jalas. 2017. "Moving Home: Houses, New Occupants and the Formation of Heating Practices." *Building Research & Information* 45 (3): 293–302. doi:10.1080/09613218.2016.1143299.

Sahakian, M. 2018. "Constructing Normality through Material and Social Lock-In: The Dynamics of Energy Consumption among Geneva's More Affluent Households." In *Demanding Energy: Space, Time and Change*, edited by A. Hui, R. Day, and G. Walker, 51–71. Cham: Springer. doi:10.1007/978-3-319-61991-0_3.

Sahakian, M., H. Rau, E. Grealis, L. Godin, G. Wallenborn, J. Backhaus, F. Friis, et al. 2021. "Challenging Social Norms to Recraft Practices: A Living Lab Approach to Reducing Household Energy Use in Eight European Countries." *Energy Research & Social Science* 72: 101881. doi:10.1016/j.erss.2020.101881.

Sahakian, M., H. Rau, and G. Wallenborn. 2020. "Making 'Sustainable Consumption' Matter: The Indoor Microclimate as Contested Cultural Artifact." *Cultural Sociology* 14 (4): 417–437. doi:10.1177/1749975520932439.

Schatzki, T. 1996. *Social Practices: A Wittgensteinian Approach to Human Activity and the Social*. Cambridge: Cambridge University Press.

Shove, E. 2003. *Comfort, Cleanliness and Convenience: The Social Organization of Normality*. Oxford: Berg.

Shove, E., M. Pantzar, and M. Watson. 2012. *The Dynamics of Social Practice Everyday Life and How It Changes*. Thousand Oaks, CA: Sage.

Shove, E., and G. Walker. 2014. "What Is Energy For? Social Practice and Energy Demand." *Theory, Culture & Society* 31 (5): 41–58. doi:10.1177/0263276414536746.

Spurling, N., A. McMeekin, E. Shove, D. Southerton, and D. Welch. 2013. "Interventions in Practice: Re-Framing Policy Approaches to Consumer Behaviour." Sustainable Practices Research Group Report. https://pure.manchester.ac.uk/ws/portalfiles/portal/32468813/full_text.pdf

Strengers, Y. 2019. "Prices as Instruments of Demand Management: Interpreting the Signals." In *Infrastructures in Practice: The Dynamics of Demand in Networked Societies*, edited by E. Shove and F. Trentmann, 184–196. London: Routledge. doi:10.4324/9781351106177.

Trentmann, F. 2009. "Disruption Is Normal: Blackouts, Breakdowns and the Elasticity of Everyday Life." In *Time, Consumption and Everyday Life*, edited by E. Shove, F. Trentmann, and R. Wilk, 67–84. London: Routledge.

Wallenborn, G., and H. Wilhite. 2014. "Rethinking Embodied Knowledge and Household Consumption." *Energy Research & Social Science* 1: 56–64. doi:10.1016/j.erss.2014.03.009.

Warde, A. 2005. "Consumption and Theories of Practice." *Journal of Consumer Culture* 5 (2): 131–153. doi:10.1177/1469540505053090.

Warde, A. 2013. "What Sort of a Practice Is Eating?" In *Sustainable Practices: Social Theory and Climate Change*, edited by E. Shove and N. Spurling, 17–30. London: Routledge.

Appendix A

Translated interview guide: households' coping with the energy crisis in Denmark

Aim and overall questions:

- To investigate how households are affected by the energy crisis and how they cope
- To map the various practices related to heat, electricity consumption, and possibly saving practices (including changes in practices, new practices, and abandoned practices)
- How do households experience energy vulnerability (e.g., associated with deprivation, shame, acceptance, empowerment, solidarity)?
- What significance do social relationships have in relation to coping, and how are the relation affected by this?
- What role do knowledge, skills, and perception play in relation to coping?
- Do ethical considerations and/or care (for oneself, others, the climate, etc.) play a role?
- How do narratives/discourses in the media play into the households' experiences and strategies?

Background

- Would you like to start by introducing yourself? (Age, family relationship, education/professional background, job, leisure interests?)
- Who lives in this house? How long have you lived here?
- Why did you move to this residence?
- What type of home (rental or owner-occupied, size, one- or two-storey, approximate year of construction)?
- Do you know what type of energy you use for heating (electricity, gas, pellet stove, other)? Have you decided on the heating method yourself?

Home tour

- We would like to see your home - would you like to show us around? (also take pictures)
- Can you describe a typical everyday life for me? What daily activities do you have (at home)?
- Have you changed anything recently due to the current energy situation (e.g., behavior, interior design, technologies, insulation)

Energy consumption and reduction

- Have you done anything to save on electricity in connection with the energy crisis? Can you give some examples?
  - Do you, for example, cook in other ways? Or have you turned off some appliances?
- Do you know whether you have a fixed or flexible electricity price?
  - How long have you had it? Have you chosen it yourself? Why?
- Do you keep an eye on the changing prices? Do you know when you have cheaper electricity?
  - How do you know?
- What does it mean for your everyday activities that the electricity price changes hour by hour?
- Are there differences between weekdays and weekends (in activities, timing, duration)?
- Have you moved any activities to cheaper periods? Why these and not others?
- Do you use "timer" function for that? Or something else?
- Is it something you have changed on an ongoing basis? Are there any specific things you do differently now that prices are rising?
- What have you not changed or what will you not compromise on?

Comfort and indoor climate

- Do you feel comfortable in your home? Why/why not?

- What does warmth/temperature mean to how you feel comfortable?
  - What about light and air (indoor climate)?
- Are there other aspects that affect whether you feel comfortable?

- What does comfort mean to you?
  - Do you feel that you have the comfort you want in your home?
- Do you have the same temperature all over, or does it vary?
- How do you regulate the heating in your home?

- Do you have any daily routines?
- Have you changed the way you regulate the heating this year (e.g., compared to last year)?
  - Do you think there is anything you will change?
- Do you use other sources to keep warm? (e.g., blankets, clothes, lights, bath)
- Is there a difference in how you and other residents in the home regulate the heat?
- How and when do you air the home (or use ventilation/hood)?

Hot water and cleanliness

- Have you changed anything in relation to how you bathe to save on heat?
- Do you wash less clothes or at a lower temperature than before?
- Do you use the dryer less?
- Do you clean in other ways?
- Does any of this affect you positively or negatively?

Social relations

- Do you do anything different when you have guests?

- Do your guests feel that you have made any changes in the home in relation to your consumption/saving on energy?
  - What do they think about it?
- Do you have conversations in the household about whether and possibly how you want or feel compelled to change things or practices at home?
- Do you agree on what changes are needed?
- Do you talk to others about energy savings?
  - When you save energy, is it something you tell others about?
  - Do you find it a difficult subject (shame, deprivation, etc.)? Or an interesting topic?

Materiality

- Do you experience challenges in your home in relation to heating the home? (e.g., poor insulation, large house, etc.)
  - If so, what do you think is the cause?
- Have you changed anything in the interior and exterior of your home? (e.g., insulation, new technologies, energy renovation)
- Is there anything you would like to change in the future?
  - Are there challenges associated with that (practical, financial)?
- Do you wish to acquire technologies to help move/reduce electricity consumption? (e.g., app, timer, smart devices, 24-hour clock)

Energy vulnerability

- How would you describe your household's situation in the current energy situation (in relation to finances and needs)?
- Do you have challenges or concerns? Which ones? (Both inside and outside the home)
- Can you save more on energy than you do now?
  - Do you find it difficult or easy to see what you could do to save more energy if you wanted to?
- What has been the hardest to change? Why? (e.g., comfort, well-being, sociality, economy)
- Have you experienced any positive changes? How? (e.g., social, time, saving money, solidarity, climate/sustainability)
- Has the situation changed your perception of certain activities? (e.g., in relation to comfort, cleanliness, inconvenience)
- Are you worried about the future? Why?
- Everything is getting more expensive these days: Does that make it difficult for you to pay for the energy you think you need?
  - Can you give examples of something you avoid because you have to save?

Sustainability/environment awareness and interest

- Are you interested in sustainability and the green transition?
- Is it easy or difficult to translate this interest into action? Why/why not?
  - In which areas is it easy/difficult?
- Are there any trade-offs between environmental considerations and other considerations that affect how you save on energy?
- Is sustainability something you care about in areas other than energy? Can you give some examples?
- Are you interested in energy and electricity supply? Why, in what way?
- Are you interested in technological solutions for energy savings? In what ways?
- If you save on energy or shift consumption, what is the primary reason for this? (e.g., price, environment, public spirit, the war in Ukraine)

Knowledge, competences, resonance

- Do you know how much your electricity and heating bill increases/has increased?
- How do you get information about your electricity and heat consumption? (e.g., consumption information online, on meters, estimate in relation to consumption, use apps)
- Is it mostly you or others in the household who keep trach of how much energy you use?
- Do you lack knowledge in the household about the best and cheapest way to use electricity and heat?
- Where do you get your knowledge from/where do you seek knowledge? (e.g., internet, telephone counselling, social relations, workplace)
- Are there stories in the media that you can recognize yourself in or that make you wonder (regarding how people are affected by the energy situation)?

View of the future

- Do you think that there are changes in your daily activities (habits) that you will stick to after the eventual end of the crisis/if electricity and heat become cheaper?
- Is there anything else you want to change in the future?
- Do you see any particular challenges/barriers in the desired or necessary changes? Do you see opportunities/benefits?

Ending the interview

- Would you like to show us exactly how you get information about your electricity and heat consumption, if it is something you normally keep track of yourself?
- Do you know how much, you approx. spend on electricity and heat per year? May we see your latest electricity and heating bills?
- That was the end of the interview. Is there anything you want to ask or add before we end?

Thank you for your time! Please call or write if you have any questions.