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Autonomy and proximity in household heating practices – the case of wood burning stoves

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Abstract

Use of wood-burning stoves as a source of household heating is increasing in Denmark; a development that is leading to considerable levels of particle pollution in residential neighbourhoods. This article reports from a sociological study of wood-burning stove users, the results of which are interpreted in relation to broader discussions regarding social preconditions for integrating environmental considerations into household energy consumption. Wood-burning stove users enjoy a decentralized and also more tangible and visible form of heating supply; one that is not part of wider energy supply systems. Moreover, stove users alter infrastructural conditions in order to pursue personal strategies for domestic heating and comfort, personal strategies that may be rooted in economic considerations or in the desire for homeliness and sensuous pleasure, referring in turn to broader socio-cultural values regarding the ideal home. A de-central and tangible form of heating, with visible environmental impact, does however not necessarily lead to integration of environmental concerns into domestic practices for energy consumption.

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Keywords: Energy, environmental concern, household practices, wood burning stoves, lifestyle

Introduction

What are the social preconditions for integrating environmental concerns into household practices in general, and into household energy consumption and heating practices in particular? Is proximity a determining factor for individuals and households to acknowledge and act upon environmental problems – proximity being defined in terms of direct personal involvement in producing negative environmental effects or direct experience of these effects, or indeed participation in their mitigation? Or are technological and societal structures at a systemic level more important? This is the analytical perspective that will be pursued in the following, while referring to a recent study of the use of wood for domestic heating in Denmark.

Energy production is at the core of a number of challenging environmental problems. Global warming is the most serious, but regional and local pollution with particles, nitrogen dioxides, sulphur, etc. is of great concern as well. Likewise, changes in energy demand, energy sources, energy technologies and the energy system as a whole play a central role in mitigating and solving these problems.

A key issue in sociological analyses of energy consumption and environment is the dialectic between actions at household level and the dynamics of larger socio-technical systems (Shove et al., 1998; Shove & Chappells, 2001; Shove, 2003a; Shove, 2004b; Geels, 2004). On one hand, millions of individual households in Denmark (and elsewhere) are part of and depend upon collective supply systems, such as district heating or networks for distribution of natural gas or electricity. At the same time standardised building elements contain built-in conditions – which in turn constitute cultural preferences – for thermal comfort, temperature regulation, ventilation and energy consumption in the home (Shove, 2003a; Shove, 2003b).

On the other hand, the scale of energy consumption for heating and other domestic purposes is highly variable, even when living conditions appear to be similar (Lutzenheiser, 1992; Gram-Hanssen, 2004a). Energy practices of households are conditioned not only by the available energy and housing technology but also by socio-cultural dynamics regarding standards of home-keeping, organisation and timing of family activities, social constructions of comfort and personal preferences (Shove, 2003a; Shove, 2003b; Shove, 2004b; Gram-Hanssen, 2006).

Also, strategies for more sustainable energy supply point in different directions, not only regarding technologies for energy production or for improving energy efficiency of various equipment, but also regarding the way in which energy supply is organized, i.e. reliance on centralised power production and distribution versus decentralised energy production even to the level of individual households (as envisioned by Rifkin, 2002; see also McDowall & Eames, 2006; Shove & Chappells, 2001). Moreover, the ability and willingness of individual households to incorporate environmental concerns into their energy consumption practices may, according to some studies, depend upon factors such as social sanction as well as proximity to and tangibility of environmental problems and solutions (Halkier, 2001; Pedersen, 2000; Iversen, 1996).

The case of domestic wood combustion is significant for several reasons. Firstly, use of wood-burning stoves in Denmark has spread considerably since the mid 1990s, and while use of wood for domestic heating has the potential to be CO₂-neutral it has also become a substantial source of local pollution. Thus, almost half the emissions of particles in Denmark – approx. 10,000 tonnes – come from domestic wood combustion (Illerup & Nielsen, 2004). Under adverse weather conditions particle pollution in quiet residential neighbourhoods made up of one-family houses can be as bad as in central urban areas with heavy traffic (Palmgren et al., 2005); and particles from wood combustion are considered to be just as harmful as those from traffic.

Secondly, wood burning stove users practice a highly de-central form of heating supply. Control and competences regarding the production of heat are to a large extent located within the household; it is within the home that critical practices take place (rather than in remote power plants). And stove users alter infrastructural conditions in order to pursue personal strategies for domestic heating and comfort, personal strategies that in turn refer to broader socio-cultural values regarding the ideal home. But even though use of these stoves makes heating, as well as the associated environmental effects, more tangible and visible, this does not necessarily mean that it is easier to integrate environmental concern into domestic practices. This point will be expanded upon in the following. The immediate sections proceed with a discussion of the central theoretical issues. This is then followed by a presentation of the case study and its findings.

Proximity and tangibility

Integration of environmental concern into household practices is conditioned by a multitude of factors that can be more or less removed from, or close to, routines, choices and actions of everyday life.

In a study of transition to bio-energy in private households, Klintman et al. discuss how societal organisation and life modes in modern societies imply a distancing and de-contextualisation between everyday life and its environmental consequences.

Connections between the actions of individuals and households and the environmental consequences of these actions become more complex and less apparent at the same time as management of crucial functions in the household, such as provision of heat and light and managing waste, are increasingly bound to distant expert systems rather than the household itself. This is also the case for household energy consumption (Klintman et al., 2003: 44, 61; referring to Giddens, 1990). For instance, in district heating systems, domestic users have no immediate sense of the production of the energy; this takes place outside the home, often far away. Nor do they have any immediate sense of the associated CO₂ emission and the future consequences for the climate. Instead, understanding of environmental consequences of everyday practices is established from publicly disseminated expert knowledge.

Aspects of this problematic are also discussed by Lene Holm Pedersen (2000) and Bente Halkier (2001). A point made by these authors is that even though a general recognition of the need for environmental consideration is widespread in society and may be acute for individuals (who for instance are asthmatic and troubled by air pollution), integration of such consideration into practices in everyday life is still ambivalent. Attention towards environmental problems can inspire 'green' practices in some fields, for instance when buying organic food or recycling glass and paper, and be of no significance in other fields, for instance in personal transportation or personal attire. It depends on what other conceptions than environmental concern are at work in conditioning the specific practices; e.g. conceptions of freedom in relation to travel by car and air (Urry, 2004; Jensen, 2006); conceptions of cleanliness, fragrance and style in relation to laundry (Shove, 2004b; Gram-Hanssen, 2006); or indeed conceptions of homeliness, comfort and autonomy in relation to domestic wood combustion.

Both Pedersen and Halkier explain how consumption must be understood in terms of identity formation and expression of socio-cultural signals rather than just satisfaction of needs. As Halkier states (2001: 30): ‘Consumption is a particular field of practice in everyday sociality which combines the satisfying of needs with expressions of identity.’ It is important to stress that expression of identity must be understood as both personal and social. Consumption may be a space where socio-cultural signals (e.g. regarding constructions of gender, ethnicity or sub-cultural belonging) are articulated more or less conspicuously through, for instance, clothes or music; but it is also a space where social norms, social distinctions and social relations are enacted more or less routinely through all sorts of everyday consumer activities.

Moreover (and adding an important point to Pedersen and Halkier), expression of social norms through consumption may be embedded in the very infrastructures that mediate consumption – such as traffic systems, heating and power supply systems, features of electronic gadgets, etc – and in that respect consumption is not a matter of pure personal choice (Shove, 2004a).

The point that consumption is a matter of enacting identity and socio-cultural norms is also relevant in relation to environmental concerns and their integration in household practices. Pedersen refers to studies that show how consumers and households are more likely to integrate environmental concerns into everyday practices by recycling waste and buying organic food than through their means of transportation and consumption of electricity. From this outset Pedersen develops the hypothesis that integration of environmental concern is more widespread when consumption and household practices are more visible and tangible, for instance when consuming organic food or recycling waste, and consequently are more likely to be the object of social control. Conversely, environmental concern is less integrated in fields of practice that are more invisible, both in themselves and regarding their potential environmental consequences, and therefore to a lesser extent are the object of social control; for instance car-based personal transport and consumption of electricity (Pedersen, 2000: 200). Similarly, Halkier finds confirmation in her studies that ‘consumers maintain or shift to an environmentally friendly practice, if the environmentally friendly element can be physically felt – visible, touchable, tasted etc’ (Halkier, 2001: 38; see also Iversen, 1996). The present article wants however to propose a number of objections to

Pedersen's and Halkier's analysis, first at a principal level and then explored through the case study of users of wood-burning stoves.

Modern environmental awareness has not developed just from reactions to directly visible/tangible environmental deterioration in everyday, local life. Rather, it has developed concurrently with the above-mentioned de-contextualisation between everyday practices and their environmental consequences. Modern environmental awareness is to a large extent concerned with problems where individual consumers and households do not have any direct practical experience of feedback between their actions and the environmental consequences of these. Instead, awareness of environmental issues is constructed in public communication through powerful narratives and symbols (cf. Eder, 1996; Dryzek, 1997; Petersen, 2007).

Moreover, of all the waste, emissions and discharges that are produced in the course of people's daily lives, determination of which elements to worry about is historically and culturally specific and conditioned by social sanctions, cultural preferences, education, and processes of enlightenment. To have a direct sensory experience of a phenomenon as damaging for health and environment is not universally given but dependent upon social constructs (cf. Douglas, 2004) – a point that is illustrated by the changing perceptions of wood smoke, as we shall see below.

Pedersen's hypothesis is based on the assumption that the threat of social sanction is a decisive factor if and when a general and abstract environmental concern is translated into concrete consumer and household practice. This assumption requires, however, that environmental concern is a dominant social norm and that demonstration of environmentally beneficial actions awards prestige. This is not necessarily the case; other and competing social norms and practical and aesthetic preferences may have a similar or higher general validity than environmental concern and thereby also be more important in forming social sanctions.

Furthermore, it could be argued that the visibility and tangibility of specific fields of household and consumer practices and their environmental consequences are far from straightforward. Rather, causal relationships between household practices and environmental consequences such as global warming or acidification or even pollution with microscopic particles are obscure and only established through publicly communicated narratives. Use of electricity may be a very inconspicuous and invisible

form of consumption, as English sociologist Elizabeth Shove (2001) has argued, but the services that electricity enable, such as lighting and use of electronic machinery, are visible and have the potential to be connected with the environmental consequences of power production. This however depends on how the field of practice is constructed in the public mind, for instance through public campaigns. Thus, official campaigns in Denmark try to make the connection evident between use of electric equipment such as tumble dryers, power consumption and CO₂ emissions (Christensen et al., 2007). The relationship between organic commodities in a supermarket and protection of groundwater quality and biodiversity is no more visible or invisible than the relationship between driving a car and air pollution or global warming. Both of these fields of consumption have enough visibility to become objects of social control. It could even be argued that using a car, for instance to take a child to school, is much more publicly visible than consuming organic food in a private home.

In general, household energy consumption and its environmental consequences are both tangible and intangible, an object of direct personal involvement but at the same time obscure, in many different ways dependent on the properties of the energy technologies and energy systems as well as on cultural values. This will be discussed with reference to previous studies of domestic heating practices before we turn to the particular case of wood-burning stoves.

Comfort and domestic heating

The aim of adjusting temperature by heating or cooling the home is to maintain an indoor climate that one can thrive in and to secure comfort and physical wellbeing.

What constitutes thermal comfort is, however, not just physiologically given.

Perceptions of comfort are culturally and socially conditioned, as are strategies for what one can and will do to maintain bodily wellbeing and the role heating technologies play in the daily activities of households. Practices for temperature regulation – or for adapting to the environment either through the use of clothing or through building construction – vary considerably across cultures and internally in societies. As Lutzenheiser (1992: 50) and Gram-Hanssen (2004a, 2004b) point out there can even be considerable differences in levels of energy consumption between households of the same size living under similar conditions.

In a cross-cultural analysis of household energy consumption in Norway and Japan, conducted in 1991 and 1992, significant differences were found in the ways energy was consumed. (The findings may no longer match current conditions but are still valid for the general point). Norwegians had a tendency to heat the whole room and all rooms in their home, while people in Fukuoka in Japan had a tendency to just heat a single room and even rely on the traditional *kotatsu*, which is a heating unit placed under the dining table where it keeps the lower part of the body of each person warm while at the same time serving as locus for family interaction. However, with changes in family lifestyle to the effect that more time was being devoted to individual activities at the expense of joint activities, habits in Japanese houses began to change towards heating more than one room in the house and heating entire rooms rather than individual bodies (Wilhite et al., 1996: 797).

To the Norwegians creation of a homely atmosphere was an important aspect of heating the house; in fact the social obligation to make your home cosy typically led to excessive heating. As opposed to the Japanese, people in Norway were also unwilling to turn the heating down at night and when leaving the house; there was a distinct dislike of entering into a cold room. This practice probably evolved under the influence of very low energy prices (due to abundant hydropower and rich offshore oil deposits), but initially continued even when energy prices started to rise, partly because excessive heating had been established as a cultural value. To keep lower room temperatures and turn heating down was considered cheap, poor and *not* homely (Wilhite et al., 1996: 798).

According to Elizabeth Shove (2003a, 2003b) expectations as to indoor climate and perceptions of bodily comfort are conditioned by the technologies that are involved in building design and temperature regulation. Integration of air-conditioning in buildings and households – not only in (southern parts of) USA and in tropical and subtropical climates but also in temperate climates – is illustrative of this. Earlier building techniques (in USA), where ‘natural’ ventilation and cooling was built into house construction in the form of deep eaves and verandas, and rooms were dimensioned and placed to provide the best climate conditions are now vanishing, and building units are instead pre-designed to accommodate air conditioning. An air-conditioned lifestyle is thereby incorporated into physical structures and with that follow expectations of a

particular kind of comfort – expectations of indoor environments that are like bubbles with a neutral and uniform climate around the clock and through all seasons of the year (Shove, 2003b: 399: see also Cooper, 1998).

A similar point can – in accordance with Shove's reflections on the construction of domestic comfort (Shove, 2003a) – be made about district and central heating. A particular perception of comfort – such as uniform temperature levels through heating rooms rather than bodies – is a main feature of central and district heating in the home. Or rather, with central and district heating thermal comfort becomes less tangible and visible, it becomes more a condition and less an activity, and even though temperature levels can be an issue of household power struggles, radiators cannot be said to constitute a locus of household activities. In describing the kind of mundane consumption that is practised in relation to utilities like electricity and water, Shove & Chappells (2001) note some key characteristics that may also apply to heating practices when consumers are part of collective energy supply systems like district heating, and those based on natural gas (delivered in pipes to burners situated in private homes) and electricity for electric heating panels: (1) The supplier remains vague and obscure to the consumer, (2) Payment is detached from consumption, (3) Households know relatively little about the networks and infrastructure which lie behind their taps, sockets... and radiators.

But with use of wood-burning stoves, heating practices display a different profile. An active effort is required to provide the fuel, to light and maintain the fire, and to dispose of the ashes. Such activities can still be routinised and incorporated into daily lives in a number of different ways, but heating is in general rendered more visible with the use of wood-burning stoves. In the following we will explore reasons for having a wood-burning stove and some of the ways in which they can be integrated into the home, and from here return to the question of visibility and tangibility as a factor in integrating environmental concern into everyday practices. But first a few words about the empirical study.

The study

In Denmark, number and use of wood burning stoves have increased considerably over the past 10-15 years. According to the Danish Energy Authority (2006) use of firewood

and wood pellets for heating in single-family houses has increased by 121 % from 1996 to 2006 (from 12,588 to 27,844 TJ) with firewood making up 70 % of the total consumption. It must be noted that wood-burning stoves should not be confused with open fireplaces. The former are closed units – although in most contemporary models they come with a glass front to allow visual experience of the fire – and they are made of metal (or, in earlier times, from tiles). Wood-burning stoves are also much more effective as a heating source than open fireplaces. They provide both radiant heat and space heating and can often heat large parts of a house. It must also be noted that wood-burning stoves designed to use firewood differ from pellet stoves. The latter come with a device that automatically feeds wood pellets into the stove. In the former, users have to build and feed the fire themselves, and it is predominantly this kind of wood use that has increased in Denmark.

The growing use of wood for domestic heating is now also causing some environmental concern due to the fact that wood combustion can cause local pollution with harmful particles, especially noticeable in areas with densely clustered one-family houses. As mentioned above almost half of the emission of particles to the atmosphere in Denmark comes from household use of wood-burning stoves (Illerup & Nielsen, 2004), and in areas with a concentration of these stoves the smoke they emit can be a serious nuisance and critical health problem. However, while pollution from domestic wood combustion is a local environmental problem, wood has the potential to be a CO₂-neutral, and thereby sustainable, energy source in a global warming perspective, as long as volumes of burned wood do not exceed volumes of growing wood.

It is on this background that a number of Danish research institutions formulated an integrated project, called WOODUSE, on environmental and health impacts as well as socio-economic aspects of domestic wood combustion in Denmark. As part of WOODUSE, an in depth interview study was conducted in March 2006, followed by a questionnaire survey conducted in November-December 2007. Interviews lasted approx. one hour and were semi-structured, i.e. they were based on a thematically organized interview-guide leaving room to follow up on associations, conversational jumps, new perspectives and in-depth reflections. Respondents were asked about their reasons for having a wood-burning stove, the ways they use their stoves, and the everyday life into which it is integrated. In the in-depth study a total of 9 households were interviewed

covering a broad spectrum of different types of habitation and heating sources – all using wood but to varying degrees. At one end of the spectrum were households with wood combustion as their sole or primary heating source; at the other end were households only using their stove once or twice a week (in season) for the sake of homeliness; and in between were households mixing wood combustion and other heating sources in various ways. In addition, respondents were selected to cover a broad spectrum of socio-demographic variables regarding age, family size, education, occupation and income.

The aim of this kind of study is not to generate statistical data, but to understand the variability of social organisation that is at work in the field and to identify patterns, i.e. qualitative differences and similarities, in the variability of social practices and conceptualisations that are investigated, (cf. Kvale, 2004; Yin, 2003).

The interviews were analysed mainly through a form of meaning categorisation. Statements and explanations of interviewees were ordered according to categories that emerged from a combination of the interview guide and the topics that surfaced during the interviews, and these categories were further differentiated into sub-typologies, (Kvale, 2004). The categories were: (1) motivations for having a stove; (2) experiences of the stove in the home; (3) lighting and maintaining fire; (4) environmental consequences. And within these categories, different statements were tentatively sorted into different types.

For the survey a questionnaire was sent by post to 1,500 households living in suburban areas characterised by one-family houses (villas, terraced houses, cluster houses). Neither rural areas nor central urban areas with apartment buildings were included, because particle pollution from domestic stoves is of little significance in such areas. Questionnaires were completed and returned from 643 households and more than half of these operated with some form of domestic wood combustion while the rest answered questions regarding local air quality and nuisance from wood combustion. This article will mainly include findings from the interview study but will also make some references to the questionnaire survey.

Motivations for wood-burning stove use

What are the reasons for having and using a wood-burning stove? The interview and survey studies revealed a selection of different reasons with economy and homeliness as the most explicit.

For some there is economic benefit in using wood for domestic heating; particularly in areas which are not part of collective supply systems for either natural gas or district heating. The scale of economic benefit does however depend on how people acquire their wood; whether they buy wood from a dealer or have the opportunity to fell wood themselves, either from their own property or from buying rights to fell wood in state or private forests.

Economic reasons do not stand alone. They are usually coupled with other motivations. For some it simply is not possible to reach a satisfactory indoor temperature with the remaining heating sources available in their homes (e.g. gas or oil-fired central heating or electric heating). This reason is indicated by 19 % of the respondents in the survey, and as the respondents, Kenneth and Maj-Britt say: 'The problem was that when the temperature was below zero during winter then you could really feel it, and it was difficult to heat [the house]. So we made the decision to have a wood-burning stove, a decision we do not regret.' Not only temperature but also quality of warmth is important. Thus, in the survey, 30 % of the respondents state that one reason for having a stove is that it provides a more pleasant kind of warmth.

The single-most important motivation for having and using a stove is the sense of homeliness, cosiness and calm that the stove is felt to provide; a sense that is achieved from the sight of the flames and embers and the sound of the crackling fire as well as from the process of lighting the fire and just having the stove as a piece of furniture in the house. In the questionnaire survey 66 % of respondents answered, 'It's cosy' (in Danish: 'Det er hyggeligt') to the question, 'Why do you have a wood-burning stove?', and the motivation was mentioned by all the subjects in the interview study (except the man who used a wood-fired boiler, placed in a shed, to run a central heating facility). For instance, the subject called Finn states: 'It is the cosiest and most homely piece of applied art ever developed. It's even better than the telly. [...] Most of all, it's a kind of therapy; to have the opportunity to sit and watch the flames... it's stress relief and it works.' And when the respondents called Peter and Line made the decision to buy a

stove they – or rather the female part of the couple – decided against a pellet stove exactly because it would not provide a cosy atmosphere.

Furthermore, the positive valorisation of stove-related cosiness and homeliness is rooted in broader cultural understandings where wood-burning stoves are seen as tokens of the good home and the good life. As the respondent called Iben says, ‘A house is not a real house until there is a wood-burning stove’. This sentiment has a nostalgic dimension, related for some informants to memories of good times spent in holiday homes. ‘It’s like after we got our stove we haven’t stopped smiling. We kind of feel that we are on holiday, in a holiday cottage or something’ (Iben). The sense of cosiness is furthermore associated with direct sensuous enjoyment, not just of the sight and sound of fire, but also the smell of wood smoke and the feeling of being warmed to the bone by radiant heat. Not all respondents enjoy radiant heat however; some actually expressing dislike for this. The point is that there is diversity in perceptions of domestic comfort and bodily wellbeing, and these perceptions are associated with personal memories and collective understandings of the good life. The point furthermore is that people actively seek to establish themselves with heating sources that match their preferences.

The different motives – or sets of motives – for having a wood-burning stove are also mirrored in the ways in which stoves are incorporated into the home and household. Some, like Iben, organise their living room around the stove and establish the experience of fire as an integral part of family life (for the adults) or, as Finn does, use the lighting and enjoyment of fire as a relaxation ritual. The fire in the stove is an end in itself – an activity in its own right.

Others like Jens and Lotte, Kenneth and Maj-Britt, or Peter and Line who are dependent on the stove as their only heating source, or at least as a necessary element in their heating supply, choose a different position for the stove. It is not given a privileged place in the way in which the living room furniture is arranged, and lighting and tending the fire does not constitute an activity in its own right, nor is the fire in the stove endowed with the same degree of sensuous pleasure. But an active, tangible and visible effort is nonetheless required to light and tend a fire when household members get up in the morning and come home from work in the afternoon; an active effort that is integrated into daily routines.

Furthermore, acquisition of fuel constitutes another visible and tangible activity related to domestic heating when using wood. The users who gather their own wood (like Einar, Christian and Jørgen) describe how they go to the forest to fell trees – some of them making a day of it, bringing their children or grandchildren along – and how they subsequently have to chop their wood and dry it. And all the stove users interviewed tell how they have to store their wood and fetch it in, adjust air intake, clean out the ashes and make sure the stove is working properly. So across different motives for having a stove, and different ways to integrate it into the household, using a wood burning stove makes household heating a more visible element in everyday life – and constitutes a more active choice by consumers.

Autonomous strategies for personal comfort

Whether it is cosiness or economy or other considerations that motivate stove users – or some combination of these – *autonomy* in household heating supply seems to be an underlying motive. An autonomy that is manifested in the ability to improve on what is perceived as insufficient heating supply; the ability to follow your own – culturally determined – preferences for sensuous comfort when furnishing your home; and also the ability to reduce dependency on collective supply systems and technologies that break down. As Christian says: ‘Once, after the hurricane, we didn’t have electricity for more than 48 hours. The trick is to keep it as simple and low-tech as possible.’

For some the wish to have a wood-burning stove implies an active and deliberate choice to remodel the house, even to the extent that a chimney is added where it previously did not exist. People break into pre-designed systems and alter them in order to meet preferences that are not embedded in the physical structures they come to inhabit. One of the families interviewed who had carried out conversion work on their small terraced house and put in a chimney did not even own the house, but lived in a neighbourhood characterised by housing association homes where a lot of residents had done the same after asking and being granted permission from the association.

British anthropologist, Daniel Miller has made similar observations in his study of residents in council houses in the UK. They do more than just adapt to the pre-designed physical structures they inhabit, they appropriate them through active conversion and refurbishing. Thereby they convert alienable goods – i.e. physical settings, which due to

their standardised and mass-produced character seem alien and impersonal – to lived and inalienable culture. At the same time, such house conversions serve as nodal points for maintenance of social relations within and outside the home (Miller, 1998; see also Mackay et al., 2001).

Likewise, from the interview study of wood-burning stove users in Denmark it transpires that the whole range of stove-related activities – considerations regarding installing a wood-burning stove and making alterations to the house to accommodate one; purchase, sourcing and preparation of wood; experiences relating to stove and wood qualities; practices for lighting and tending the fire, etc – are a recurrent theme for conversation and interaction within the household as well as with neighbours, family and colleagues.

A study made by Klintman, Mårtensson and Johansson (2003) in Sweden and the state of Massachusetts in USA examined preconditions and obstacles for transition to bio-energy in private households, and in this study self-determination also appeared as an important aspect in household energy practices. It turned out to be valuable for some (but not all) of the respondents to avoid large energy supply systems and the dependence and powerlessness they feel such systems imply (Klintman et al., 2003: 47).

The inclination to self-determination is not just a question of the credibility of specific energy companies. As discussed above it is a question of where competences to provide and manage household heating are located. In socio-technical systems of heating – which are crucial, not just for the wellbeing of residents, but for the very subsistence of households, at least in temperate climates – competences to provide warmth, comfort and good living conditions are not necessarily located at household level. They are to a large extent bound in expert systems, for instance in the form of networks for district heating, natural gas distribution and power supply (Klintman et al., 2003: 44).

But that de-contextualisation is reversed with the use of stoves. Integrating a stove into the household's heating supply requires an active effort: you have to acquire the necessary fuel, light the fire, tend it, make sure it goes out properly and empty the stove regularly. Or put differently: a stove makes it possible to relate more actively and consciously to heating supply and to locate more of the necessary competences within the household. 'You think more about it than when you are just using district heating. It

involves some work. That is also a choice. And then I really like that you have to make an effort if you want to have heat' – as said by the respondent called Christian, who gathers his own wood in a nearby forest every year. On the other side of the Atlantic and in a different socio-cultural context, an interviewee in Massachusetts expresses similar sentiments when he remarks that: 'The pellet stove is actually much more work for me. But I enjoy it, and it gets you that sense of freedom whatever the hell that means' (Klintman et al., 2003: 47).

Conversely, when relying on district heating much less work and much less inconvenience is required to keep warm during the cold season, and this – it could be hypothesised – can also be perceived as facilitating a sense of self-determination or freedom. Being relieved of the struggle for subsistence and being able to trust expert systems to provide basic needs allows people to devote more time and attention to personal development. In other words, sense of self-determination can be located differently: as liberation from the constraints of subsistence or as self-determination in ordering one's basic living conditions.

Environmental concerns

Self-determination in household heating practices may be a positive value for some consumers, but it does not correspond unambiguously with attentiveness to the environmental consequences of energy consumption, e.g. emission of CO₂, particles, sulphur and nitrogen dioxide.

In Denmark district heating systems are a widespread source of domestic heating. In 2006 60 % of household heating installations were attached to district heating, 16 % were oil-fired, and 14 % were fired with natural gas (Danish Energy Authority, 2007). District heating systems are in general based on combined heat and power (CHP) production from natural gas, coal, oil, waste, but also biomass such as straw. Competences for and control over this kind of heating are very much located centrally in the expert system and far from the household user, but are also much more energy efficient and comparatively less CO₂-polluting than private installations using fossil fuels, where control and competences to a larger extent are located in the household.

With wood-burning stoves, competences and control over heating practices are also to a large extent located within the household – except for the necessary technological

knowledge to construct stoves to maximise their energy efficiency – and this heating source does have the potential to be CO₂-neutral, as long as volumes of burned wood do not exceed volumes of growing wood. On the other hand, wood combustion can cause significant levels of local particulate pollution (Palmgren et al., 2005; Glasius et al., 2007). The extent of this kind of pollution depends on factors that are partly under the household's own control. These factors include:

- Properties of the wood-burning stove: It is possible to procure an energy-efficient stove that burns up more of the potentially harmful gasses and particles.
- Condition and properties of the chimney: Advice of chimney sweeps can be followed to make sure chimneys function optimally.
- The kind of fuel that is used: Use of painted, oiled or pressure-treated wood, compressed paper (from newspapers), cardboard, various wastes or any other kind of fuel that is not pure wood will cause heavier and more toxic pollution.
- Condition of the fuel: Wood has to be dried for at least one year in order to burn properly.

The question is how stove users perceive these environmental consequences and their own part in them.

In general, wood combustion is not perceived by the respondents as a particularly harmful energy source. 'Without being an expert I would think that if you do it properly... I imagine that it isn't more polluting than burning oil' (Iben). One informant characterises wood combustion as a renewable and sustainable energy source: 'Yes, because it doesn't contribute to the increase in CO₂ emissions, does it, since it's CO₂-neutral? Whether it decomposes in the forest or is burned is immaterial. The issue is whether it is burned properly' (Christian). In the survey only 5 % mentioned concern for the climate as a reason for having a wood-burning stove, but for these consumers the use of stoves is understood within the wider cognitive framework concerning some of the more intangible environmental problems. Awareness of the causal links between energy production, greenhouse gas emission and climate change does not refer to direct sensuous experiences but to knowledge disseminated through education or in the general public.

Klintman et al. report from their study that use of wood-burning stoves by the respondents in Sweden is perceived as something original and therefore natural and good, a perception that is related to collective experiences of wood combustion as humanity's oldest energy source. The process of combustion is not perceived as harmful; the scent of wood smoke is even perceived as good and is coupled with childhood memories and early experiences (Klintman et al., 2003: 61, 64).

Similar positive connotations surfaced in our Danish study. In the survey, 59 % of respondents (with or without a stove) characterised the smell of wood smoke as nice or cosy. Bearing in mind that the emission of particles from domestic wood combustion is potentially damaging to people's health it is noteworthy that wood smoke – a kind of pollution that is very close to people and can be directly sensed – is cognitively framed as not only relatively harmless but as a cultural value and life quality benefit. Respondents perceive the smell of smoke from pure wood – something they have direct sensuous experiences of on a daily basis in the season – as pleasant. They do not relate that smell to any hazardous effect on environment or health. 'When we are out walking the dog in the evening there is a real scent of wood-smoke stoves, and I can see all the chimneys. I think it's nice and cosy. Nothing to be bothered about at all' (Peter & Line).

Still, such framings are subject to changing cultural moods. Thus, older informants can tell that 30 years ago burning of painted wood and other kinds of waste in domestic stoves was considered less problematic or even as an environmentally sound form of waste management. But today most of the respondents in the study of stove users find the fumes from such fuels very foul smelling and relate the bad smell to the hazardous character of the fumes. As Jens & Lotte recount: 'There was one summer where we had to pull the kids indoors, because a blue cloud came over from our neighbour. He just decided he wanted to burn something in a steel barrel. It's the same stuff he uses indoors. It's disgusting, especially because he lives so close by. The smell is anything but pleasant.'

Levels and toxicity of particle pollution from wood combustion vary considerably according to the specific practices that are applied, and these various practices are also perceived in different ways by the respondents. Thus, all respondents in the study had experienced problems with damp wood; they had sensed how it burned poorly and produced lots of smoke, and the smell from painted or otherwise processed wood was

characterised as downright poisonous. There appeared to be a clear social norm that you cannot put whatever you want into your wood-burning stove. Most of the respondents told stories about *other* people – neighbours, colleagues, people they had heard about – who have used inappropriate kinds of fuel, and that kind of behaviour clearly stood out as a breach of social norms.

Apart from the above, environmental concern in the specific practices for wood burning is balanced with or subordinated against other concerns or is not a consideration at all. Some respondents tell that from time to time they might burn newspapers in the stove. ‘If I have a lot of them and I can’t be bothered to drive them down to the recycling container, then I burn them. But it gives a lot of ashes, which I ordinarily use in the garden, but not the ashes from newspapers’ (Christian). And one of the respondents who previously heated his entire house with a wood-fired central heating installation tells that he sometimes used damp wood and papers and old furniture because he could not manage to maintain sufficient supplies of clean, dry wood. Even when neighbours (with whom he had a good relationship) mentioned that there were problems it was not enough for him to change practice. ‘I dumped anything in that boiler. You just have to get the fire going... But it wasn’t good for the environment. I must admit that I was a bit of a pig’ (Jørgen). (This respondent recently changed to a natural gas central heating plus a wood-burning stove in the living room, because he is getting older and cannot gather so much wood anymore, and he is now also very conscientious in the way he uses the new stove).

Yet another concern is to avoid being cold in the morning and therefore maintain a fire for as long as possible during the night. The technique is to turn the air intake down as far as possible. This, however, causes incomplete combustion of the fuel resulting in emission of more particles. ‘You have to learn for yourself how your stove works and how you get it to burn as long as possible. The method is to turn down the... It creates quite a bit of soot if you turn the air intake too much down. That way you can keep the fire going through the night, but it’s not good for the combustion process’ (Jens and Lotte).

These are examples of how environmental concerns can be set aside in concrete situations even when agency and competences are located within the household and when close-at-hand, sensuous experience of environmentally damaging effects of one’s

own practice exist – in the form of dark smoke, foul smell, large amounts of ashes, remarks from neighbours, etc. Other concerns, such as what you have time and energy for or the need to avoid cold feet in the morning, become more important in some, but not all, specific situations in the course of everyday life, even when the respondents are conscious about environmental problems and let that knowledge inform their practice at other times.

In other words, when competences and control over heating supply are localised to individual households, so is the balancing of different concerns in everyday routines. A balance may result that is not necessarily to the benefit of the environment, even when environmental effects are apparent and the possibility of social sanction may seem obvious.

Conclusions

Based on the interview study and the theoretical discussions above, the following conclusions can be suggested regarding use of wood burning stoves specifically and integration of environmental concern in household heating practices in general.

Contrary to Shove's understanding of the determining force of large supply systems households can and will choose actively, for domestic comfort, to alter conditions embedded in the structure of heating systems and in the physical attributes of building units. This is one lesson apparent from the case of wood-burning stoves. Stove users choose to make such alterations both for economic reasons and to accommodate their own needs and preferences regarding the sensuous experience of heating – preferences that in turn are formed by cultural perceptions of the ideal home.

Wood-burning stoves and wood combustion are perceived within different cognitive contexts including a nostalgic and an environmental framework. In both cases wood combustion is seen as a good and clean energy source. For some, wood combustion is perceived within a broader understanding of energy and environment and seen as one answer to general, but intangible, environmental problems.

Even though the use of wood-burning stoves requires tangible involvement of the users and control, and knowledge of the technology are located within the household rather than bound in a distant expert system, and even though environmental problems stemming from the use of wood stoves are close-at-hand and can be sensed and

experienced directly in the course of everyday life, such conditions do not necessarily lead to greater environmental awareness. Smoke from burning wood is even perceived as something positive. In other words, visibility, tangibility and proximity are not *the* determining factors for translating general and abstract environmental concerns into concrete practices. Rather, possible environmental impacts of specific practices become visible because knowledge about these practices and their causal links to environmental impacts are spread in the general public and informally through social networks and face-to-face interaction between households and professionals such as wood-burning stove dealers and chimney sweeps.

Wood-burning stoves are a subject of social interaction, a subject of conversation and cooperation between neighbours, colleagues and family as well as between professionals and lay people, and through this interaction norms for domestic wood combustion are negotiated and circulated. Social sanctions can be enforced against practices damaging to the environment and health but not before norms on the subject have become dominant (such as norms for not putting painted and otherwise processed wood into the household stove).

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