INTRODUCTION
Scandinavia is inhabited by 'kitchen-people' (Gullestad 1984). They are a people who dwell in steady, well insulated houses with pitched roofs; a people who love spending time with family and friends in the kitchen, and who put a lot of effort into making their homes warm and cosy. They are a people who tend to emphasize similarity as a sign of equality, and who, consequently, tend to de-emphasize the gender division of household responsibilities (Gullestad 1992).

Professionals engaged in the development and construction of sustainable buildings and renewable energy systems could contribute more actively to the reduction of CO₂ emissions, were they to take a wider interest in culture specific ways of living. In a recent design handbook for solar combisystems, Bergmann and Meir (2003) focus to a large extent on the aesthetic taste of architects, and argue for a better collaboration between engineers, architects and planners. My argument here, however, is that it is not only important for the implementation of solar heating that the design and planning of buildings is coordinated with research and development of solar collector components. Even more important is to put the presumptive users considerably more into focus than is the case today. This means that cultural variation has to be taken into consideration, and that it is not enough to consider climatic conditions or the traditional form of the house to understand how and why solar heating has been put into use at different times and in different parts of the world (Butti and Perlin 1980; Henning 2000). Questions have also to be asked concerning the priorities and everyday lives of specific groups of people.

The following text provides an illustration taken from Swedish single-family houses and the households that inhabit them. I have chosen to focus on three culture specific aspects; perceptions of house and home, of private and public space, and of male and female space. From these three angles, I give some clues as to how the design, performance and location of solar and bio-pellet heating systems could be made resonant with predominant experiences, habits and ways of thinking among men and women respectively. We also get some clues as to how the marketing, design and possible locations of such heating systems may have an impact on household installation decisions.

One background to this chapter is the aim of the Swedish government to reduce the amount of oil and electricity for heating; another the fact that a substantial number of single-family houses in Sweden have been constructed without a basement, boiler-room or other suitable space for locating a house-based heating system. Wider use of solar and--or pellet heating systems is one way of reducing the amount of fossil fuels used for heating purposes, and the chapter deals with the question of how such systems could be fitted into single-family houses that do not have a basement or boiler room (Pellets are small pieces of compressed bio-fuel, often saw-dust left-over from the forest industry. The use of this fuel is increasing rapidly in Sweden. It is easy
to transport and handle, and due to effective combustion, emissions dangerous to health are reduced).

METHODS AND THEORETICAL APPROACH
I have drawn upon material from two research projects. In the first, I studied attempts to implement solar heating systems in various Swedish contexts. Conclusions and examples used here were collected during an extensive field study comprising a period of four years (Henning 2000). In the second, multi-disciplinary project I focused on the conversion of Swedish single-family houses from electric resistance heating to heating systems that combine solar heating with the burning of bio-pellet (Henning 2001, 2003a, 2003b, 2004). My conclusions from this project are based on literature studies, and supported by results from recurrent interviews with both husband and wife in ten households.

Social anthropologists have tended to focus either on the house as a local idiom for lineage-like groupings or on households and economy (Hugh-Jones 1996: 248). However, Carsten and Hugh-Jones (1996) have asked not only for a greater anthropological interest in how houses are built and used by ordinary people concerned with their day-to-day affairs, but for a sharper focus on the building itself. The anthropological approach chosen here takes as one of its starting-points culture specific ways of using and perceiving various spaces of the dwelling. However, I also attempt to combine the cultural meaning of the Swedish house and home with culture specific ways of perceiving solar collectors and pellet-fuelled stoves and boilers.

There can, of course, never be an objective opinion about the appearance of a heating system or part of such a system, like for example a solar collector. When material, form and size are taken into account in anthropological research, this is always done with an awareness of there being no simple connections between, for example, the size of an artefact and its role as a cultural representation. It is even seen as one of the major tasks of social anthropology to convey to a broader public the crucial importance of cultural context for understanding the meaning of artefacts and habits. When Appadurai in an article (1990) proclaimed his interest in the artefacts per se, his primary intention was to point out that a commodity is not in the first place a special kind of artefact, but an artefact in a certain situation. We find a similar approach to material objects in Thomas´ book ‘Entangled Objects’ (1991). With the possible exception of archaeological anthropology or anthropology of art, I believe Miller (1992) to be one of the few social anthropologists who, in recent years, has explicitly argued that the physical forms of artefacts definitely can have a complicated, albeit fully analyzable, connection to the cultural context. Both these approaches are considered in the chapter.

BACKGROUND
Partly due to the long cold winters, the building sector stands for the single largest consumption of energy in Sweden. The heating of buildings has gone through many changes during the twentieth century. In the late 1940s, waterborne central heating had a great breakthrough and was installed in the majority of new houses. District heating was introduced at the beginning of the 1950s, and heat delivered through waterborne district heating increased rapidly between 1965 and 1980 (SOU 1995: 140-42, para.10f). The next big change began in the mid 1970s and accelerated in
the early 1980s. This was the conversion to electric resistance heating, largely due to a dramatic rise in oil prices, while simultaneously the price for electricity and electric equipment was low. It was also due to extensive construction of nuclear power plants in Sweden from 1970 onwards, leading to the largest per capita nuclear power programme in the world (Summerton 1994).

In 1997, the Swedish government agreed on a strategy for adjusting the national energy systems (Energimyndigheten 2003b). This energy programme included two parts, one aimed at reducing carbon dioxide emissions, the other at replacing electricity produced by nuclear power (which is indirectly also a way of reducing carbon dioxide emissions, as the European electric supply network gets a large part of its electricity from coal, fossil gas and oil). The use of boilers for oil alone has been steadily decreasing for some time in single-family houses. Also district heating is increasingly using bio fuel rather than oil.

At present, there is an increasing interest among house-owners in replacing or combining electric heating or oil with bio-fuel, and at least 460,000 of the 1.5 million single-family houses in Sweden now have some kind of combined solution for heating (Energimyndigheten 2003a; Overland and Sandberg 2003). Still, many single-family houses have little space in which a home-based heating system could easily be located, as around 40 per cent of the houses are electrically heated, and more than 10 per cent are connected to the district heating system (Overland and Sandberg 2003; SCB 2002). Many of these houses were constructed for electric resistance radiators or a heat exchanger alone. They have neither basement, boiler room, nor other spaces in which a new heating system could easily be fitted in.

THE EQUAL HOUSE
Most commonly, the Swedish single-family house displays an ethos of similarity and equality rather than of individuality and hierarchy, and it does so in a double sense of the word. Due to an ideology of equality, a house-owner in Sweden generally makes sure that the appearance of the house does not differ too much from the appearance of neighbouring houses. But for other reasons as well, very similar single-family houses may be seen from the north of Sweden and through the 1650 km. down to the very south.

Orders from building contractors to a few larger prefabricated-house firms, and quite a few regulations as to how one is allowed to build, provide two further explanations of this similarity. Yet another has to do with the cold climate, which makes stable, well insulated houses a necessity. The sometimes heavy snowfalls are also one reason why most single family houses have pitched roofs, clad in roofing tiles, to allow the snow to slide off the roof and thus not weigh too heavily on it. On the other hand, similar conditions exist in French Canada yet one vernacular style of housing there employs a ‘flat roof’ in order to use the accumulated snow as insulation.

Many of the inhabitants in Österå were born in the village with its old style red painted wooden houses. Others had moved there, either restoring an old house or building a new one in a style of their choice (Henning 2000). So, even though a certain similarity among residential buildings may be observed from north to south, the choice of house or living area still shows something about one’s taste, economy, and style of
living. It may give others an idea of who you are, as well as confirming to yourself who you are and with whom and what you identify.

**Public and Private Space**

Certainly, house-owners may choose whether to draw attention to themselves, or whether to avoid this. Primarily though, houses are merely an appropriate background for living (Henning 2000). Whether tending to display similarity and equality as in Sweden, or hierarchy, wealth and power as in South-East Asia (Waterson 1996), they should not draw attention to themselves by appearing in some way wrong or inappropriate (Henning 2000; Miller 1992). As the exterior of the house can be observed by every neighbour or person that passes by, it is the most public space of the home. The identity that it lends the household may get widely spread. Furthermore, the possibilities of controlling the ways in which others perceive the house and (thereby) its inhabitants, is primarily restricted by economic resources when choosing a house or by the ability to work upon the facade (Carsten and Hugh-Jones 1996; Waterson 1996).

Unlike, for instance, the Mediterranean area (Booth 1999; James and Kalisperis 1999; Lawrence 1987), in the Scandinavian area, there is often a sharp boundary between outdoor and indoor activities. This is particularly obvious during the cold season of the year, when people do not move in and out of the houses so much, and when most activities are carried out indoors. People also meet more often at home, at work, or through recreational courses (the popular 'study circles'), than in restaurants, pubs or cafés (Blid 1989; Gullestad 1992; Sjögren 1993).

Much more than the front of the house, the interior gives detailed information concerning the house-owners’ age, gender, family history, taste, life style, and feeling for order (Blanton 1994). Primarily, the inside of the house is a meeting place for relatives and close friends (Birdwell-Pheasant and Lawrence-Zúniga 1999; Sjögren 1993). The front door marks a social boundary and creates a way of controlling where that boundary should be drawn. Still, as Miller (2001) and Clarke (2001) have also pointed out and demonstrated, there is no clear dichotomy between private indoor and public outdoor space. Gardens surrounding Swedish single-family houses are, for instance, considered very private, despite their often invisible boundaries (Björklund 1983; Sjögren 1993). And inside the house, certain zones are more public than others. It is in these more public indoor spaces that members of the household socialize with friends and relatives who do not belong to the household (Birdwell-Pheasant and Lawrence-Zúniga 1999; Gullestad 1992; Junkala 1988).

**FIGURE 1  HENNING NEAR HERE (HALLWAY)**

The hallway of the house works as a floodgate or checkpoint, where people may be either turned away or invited into the house (Gullestad 1992; Junkala 1988). It is therefore one of the most public zones of the interior, and the first space you enter when coming through the front door. One of the women in the study by Lövgren and Ramberg (1997) commented that her apartment must have been planned by a man, since 'no woman would put the entrance directly into the living-room without a hallway in between'.
The social multi-functional kitchen

Booth's (1999) description of how entire housing areas were reconstructed after a big earthquake in Sicily in 1968, clearly illustrates the importance of cultural awareness in architecture and the importance for architects and planners not to take too much for granted, even concerning people in the same country. When reconstructing the housing areas in Sicily, planners from northern Italy made well-equipped but fairly small kitchens located at the back of the houses. They took a wish for privacy for granted, as well as a general wish for ‘modern’ kitchens for people mainly working outside the home. However, a majority of the Sicilian women saw the new kitchens as both inconvenient and limiting, and many of them used a substantial part of the household income for changing the new home. The solution was to transform the garage into a traditional kitchen. Here, the women could again both work and socialize with neighbours and friends.

Similarly studies from Sweden, Finland and Norway show how displeased people get when they are stuck with a small kitchen. A Scandinavian kitchen should be cosy, warm and nice, and it should be big enough to fit at least all the household members around the kitchen table (Gullestad 1992; Junkala 1988; Lövgren and Ramberg 1997). The kitchen is the primary dining area and the space in which household members have most of their meals (Lindquist et al. 1980; Londos 1993; Lövgren and Ramberg 1997).

But the kitchen is also a public space of the house used by male and female household members of all ages, not merely when socializing with one another, but when socializing with friends and relatives as well. The kitchen and living-room could be described as complementary social rooms that are used to create flexibility. If one couple comes to see another couple, for example, the women may go into the kitchen to be able to chat more intimately with one another, while the two men gather in the living-room. Also, the complementary function of these rooms makes it possible to manipulate a situation and chose how it should be defined. Thus, showing a guest into the living-room could either be a way of honouring him or her, or it could be a way of creating a distance (Gullestad 1992). These are some of the reasons why many people do not want an open plan solution with no door and wall between living-room and kitchen.

Kitchens may also have several other functions besides cooking, baking and socializing. A study from Finland shows that bills etc are kept in this space (Junkala 1988). And a Norwegian study shows how women even keep cosmetics, hair brushes and combs in the kitchen, and how they sit there when putting on their make-up and arranging their hair (Gullestad 1992). A parallel could be drawn here between the present Scandinavian kitchen and the many functions that used to surround the open fire in houses in the countryside up to the end of the nineteenth century (Junkala 1988; Palmqvist 1999).

The Scandinavian kitchen, a social space with many functions, differs completely from the concept of the kitchen in other countries, as for example the Indian kitchen. Unlike Sweden, in a large part of India the kitchen is considered a private zone by many middle class families. Here, outside guests are seldom invited into the kitchen, and in some cases even the entry of children or other members of the household may be restricted during cooking.
The tidy decorated living-room
The living-room has a higher priority than other parts of the house. It is often kept extra clean and tidy, so that a visitor may understand that those who live in this house are orderly people. This space usually contains the best furniture, lamps and paintings. The furniture is decorated with table-cloth and ornaments, and the windows with flowers and patterned curtains. The room is almost never used for work, and predominantly not for the children and their play. In this room one would find wedding and family portraits, along with other artefacts that give evidence of the lives and social positions of the household members (Gullestad 1992; Londos 1993). At night, household members gather in the living-room to relax. Usually, this means drinking coffee and watching TV or listening to music. Someone might read or possibly sew or knit.

FIGURE 2 HENNING NEAR HERE (watching TV in the living-room)

As ever before, people in Scandinavia take an interest in forming their houses into 'homes'. Most people do not any longer spend time on making clothes or jam, for instance. Instead, more and more people spend more and more time, money and energy on decorating their homes. These people do not just renovate their homes or rearrange their furniture when they move, or when things get worn out. They do this for the sake of renewal in itself (Garvey 2001; Gullestad 1992; Wallensteen-Jaeger 1975). Or rather, they do this in order to express values, life style, identity, and social standing (Daun 1974; Junkala 1998; Miller 1992). And they do this in order to prove to themselves, friends and relatives, that they are a 'real' family (Gullestad 1992).

THE EQUAL COUPLE
Scandinavian couples tend to see themselves as teams that share household tasks and responsibilities. They do, however, also tend to believe they follow that principle more than they actually do. The culture specific and predominant ideals of sharing and equality defined as sameness imply that traditional gender roles can no longer be fully taken for granted. Household tasks are often negotiated, even though some tasks more than others have accumulated and retained symbolic value as belonging to one gender or the other (Gullestad 1992). Side by side with the 'do-it-together' ideology, people more or less consciously tend to perceive certain tasks as more male, and certain others as more female (Gullestad 1984, 1992; Rosengren 1991).

Home decoration and reconstruction projects are popular joint husband and wife tasks. In these projects, as in other parts of everyday life, men are expected to be handy and good at construction work and repairs, while women are seen as aesthetic and emotional specialists, having the main responsibility for the creation of a cosy and tasteful home. Simultaneously, home improvement projects are perfect ways of creating and maintaining the ideals of togetherness and equality, and for many women they provide a tangible symbol of the man’s interest in the home, and thus in her and the rest of the family (Gullestad 1984, 1992; Rosengren 1991).

Male and female space
Certain zones of residential buildings are also treated as more male or female than others (Ardener 1997). Even if men and women in Sweden normally do not
themselves think of the home as anything but gender neutral, the woman is usually responsible, not only for coordinating activities of the household members (Mårtensson et al. 1993), but for the overall planning of the interior of the house (Almqvist 1993; Friberg 1990; Gunnemark 1998; Jakobsen and Karlsson 1993). This responsibility does not merely mean taking the initiative as to when the vacuum cleaner should be used, but also that she, at least to a certain degree, controls where objects and people should be located. Certain areas, however, are treated as male spaces in which few women would take an interest. The boiler room and the garage are examples of such male zones of the interior (Gullestad 1984, 1992; Gunnemark 1998).

In a study by Rosengren (1991), she describes how young Swedish couples build a house of their own. Here, the gender division of tasks are clearly associated with the inside and the outside of the house. Rosengren describes how both spouses were committed to a house building project in the initial stage, and how they discussed it and made decisions together. Nevertheless, as the construction work continued, their different decision responsibilities got more and more detailed and separate from one another. Craftsmanship was more his responsibility, aesthetic thinking more hers. The main dividing line was drawn between the outside of the house, which was his area, and the inside of the house, which was considered her sphere of interest and competence. Sometimes one spouse would have opinions on matters considered more the responsibility of the other, although in such cases he or she easily gave way to the other person if they did not agree. Most interesting in this study, I believe, is that the only times a husband and wife really argued with each other was on issues where the outside and the inside met, such as what colour the window-frames should have, or whether they should have asphalt or stone in front of the main entrance. The meeting-point of outside and inside was, thus, also the meeting-point of male and female spheres of interest, competence, and decision.

A male heater in a male space - the pellet burner success
First, some definitions: a stove is an enclosed combustion space, designed for use in the living quarters; it may or may not have a water jacket connected to the hot water system of the house. A boiler is similar to a stove, typically larger and designed to be placed in a separate room; it usually contains a small hot water storage tank for domestic hot water and it is always connected to the heating system of the house (in Sweden generally a waterborne system). A burner combusts a fuel and is part of, or connected to, the boiler. A heat store is a hot water storage tank, typically 500 litres.

Despite the fact that the pellet stove was introduced in Sweden prior to the pellet burner, the burner has been a far greater success so far. Only one sixth of the pellet heating systems sold have been stoves. It seems clear that the introduction of the burner has been easier in several respects. First, single-family houses where pellet burners are installed normally have a basement and a boiler room. This means there are few problems with fitting the heating system into the house. Second, the boiler-room is a male space, as handling a boiler with its burner and hot water store is primarily considered a male task. Women in Scandinavian households would rarely question the opinions of the man in such clearly traditionally male areas (Gullestad 1984; Londos 1993; Mårtensson and Pettersson 1998; Mårtensson et al. 1993). Thus, in several respects, a decision to purchase a pellet burner is an easy one, and it could be taken by the man alone.
Third, no radical change of the previous heating system is needed. About half of the pellet burners have been installed in boilers previously run on oil, the other half in boilers previously run on logs of wood or heated by electricity (Energimagasinet 2003; Fiedler 2004). Also, there are few other special requirements for the design of the burner and boiler, as the boiler room is constructed solely for the purpose of housing the boiler. The burner, boiler, and heat store do not have to be neat, small, clean and presentable to guests. The challenge now rather lies in fitting boilers and hot water stores into single-family houses that lack basements and boiler rooms. A short discussion on technical requirements for smaller systems can be found in Kovacs and Weiss (2003).

A male heater in a female space - conflicting interests
For single-family houses with no basement or boiler room, the laundry might be used for a boiler or hot water store connected to the solar heating system or waterborne pellet system. We might, however, expect to find conflicts of opinion within the household concerning the coexistence of boiler and washing machine in this location. Certain household tasks (such as laundry), and tasks perceived as technical (like handling a boiler), are more than many others marked as female and male respectively (Nordenmark 1997; Londos 1993; Mårtensson and Pettersson 1998).

The equipment would have to be substantially smaller, cleaner, and neater in appearance than the normal Swedish standard. Integrated pellet boilers with automatic cleaning, more similar to products used on the Austrian and German market, would have to be used (Fiedler 2004). Even so, whether or not boilers and washing machines can share space, depends not only on the design of the boiler, but also on the ability of husband and wife to come to an agreement concerning their respective interests and responsibilities.

A heater in a public space - cosy, tidy, and aesthetically appealing
The hallway, the kitchen or the living-room may all be possible locations for a pellet stove. Since the hallway is the first room a guest enters, the style and cleanliness of a stove or boiler in this space is of utmost importance for its acceptance. Most probably, the stove would also have to be quite small in order to fit into this room. From a technical point of view, the hallway would make a perfect spot for a pellet stove, since it would then be located in a central position in the house with close connection to several rooms. Also, the hallway could maintain a higher temperature than other rooms, as household members do not usually spend any length of time there. This way, the heat would be used and distributed in the most effective way (Persson and Nordlander 2003). Bedrooms, often located on the top floor, would be cooler, which is well in line with the wish of a majority of Swedish house-owners (Gaunt 1985; Henning 2003b). These reasons for locating a heating system in the hallway do not apply however to a boiler or water jacketed stove.

Only few interviews have so far been made in households with stove, boiler or open fire in the kitchen, but these show very pleased reactions to the location (Henning 2003b). Taking into account the multifunctional idea of the kitchen and the wish for warmth and cosiness when gathering there, it should be possible to make pellet
stoves or boilers attractive enough to be fitted in here. The popularity of spending time and money on the reconstruction of kitchens, and the popularity of interior design magazines with pictures of kitchens with an open fire, should also contribute to acceptance for this location. Most probably, the main interest would be found among women, even though female responsibilities for the kitchen vary with age and social class (Gullestad 1992; Junkala 1998) and is not as dominant in Northern Europe as in many other parts of the world.

However, the living-room might be the most obvious space in which to place a pellet stove, as this is where members of the household preferably would gather around an open fire - if they had room and could afford one, that is. Still, a pellet stove in this room has to be silent so that it can be used simultaneously with the TV or CD-player. One of the women in our interview study (Henning 2003b), complained about the peculiarity of a small, green, attractive stove that ‘sounds as if it belongs in a boiler room in the basement’. In their household, they had to shut off the stove when they wished to watch TV.

FIGURE 4 HENNING NEAR HERE (pellet stove in living-room)

If a wider acceptance of pellet stoves is to occur, the fact that many people try to keep their living-rooms clean and tidy has to be taken into account. To decorate, furnish and arrange a home in the right style is a lot about placing the right objects in the right spots. Representations of dirt and cleanliness are very much about this same thing, about keeping everything in the right place in the way this is culturally understood (Douglas 1988). This means that a sooty boiler would be no problem in a boiler room, which is meant to accommodate exactly such an artefact. Such a boiler or stove in the kitchen, bathroom, laundry, hallway or living-room, however, would be quite another thing.

Aesthetics is even more important when considering the living-room as location for a stove, or even boiler. While one of the impediments in the market introduction of solar heating systems has been an extremely strong focus on installation costs (Henning 2000), this, I am sure, will not be the case with pellet stoves. One reason for my making such an assertive prediction is the willingness of people in Sweden to spend money on furniture and other artefacts that may improve the feeling of cosiness and homelike atmosphere.

A pellet stove design has to balance somewhere in between several requirements (Henning 2003b). Stoves need to be easy to handle and should not prevent their owners form keeping the living-rooms tidy. However, when contemplating ways in which to increase the popularity of pellet stoves, one should also consider the fact that a Swedish home is seen as attractive, comfortable and ‘cosy’ (hemtrevligt, mysigt) when it is perceived as ‘warm’ in both a literal and figurative sense. Ornaments, curtains, flowers and other decorations enhance the perception of the home as warm and welcoming, as do candles and the warmth from a stove or open fire. A decorative pellet stove could contribute to this perception of a ‘warm’ home. Most probably, it could also be made to resemble the open fire, which not only engages all human senses, but evokes positive memories of togetherness, childhood experiences, and culture specific dreams of a red cottage by the lake.
THE INSECURE SOLAR COLLECTOR
Also here, first some definitions: a solar thermal system for a Swedish single-family house consists of a solar collector, a heat store in the form of an insulated tank filled with water, plus connecting pipes, a pump and a heat exchanger. In Sweden, small systems produce domestic hot water from May through to September. More common, however, are the larger combi-systems, which also provide the house heating system with hot water from early spring to late autumn. An auxiliary heat source is needed for periods of little or no sunshine.

In Greece and the United States, solar collectors are often mounted on stands and placed on top of flat roofs. In Sweden, they have instead become more and more integrated into the roofs, thus becoming more fully part of the buildings. Apart from what one might expect knowing this, one of the most characteristic features of the Swedish solar heating systems for individual homes is the extreme visibility of the collectors. This visibility is partly due to the importance put on the look of the building, as described earlier, but also to the unfamiliarity of solar collector-covered roofs.

FIGURE 5 HENNING NEAR HERE (yellow house)

To many people it is not clear how the solar collector should be classified (Henning 2000). It is obviously a part of the house and most often a part of the roof, but it is more noticeable than the chimney, for example, in spite of its less prominent form. The chimney just sits there like it always has; there is no need to wonder about what it looks like. With the solar collector, things are different. People seem to wonder what this artefact really looks like, if it is all right to have it on their house, and what their friends and neighbours will say. The glass on the collector makes it shiny like a window. It is however much bigger than a skylight or a dormer window, and it does not have a little roof above it as the dormer window usually does. Neither does it look like roofing tiles with its flat shiny surface.

However, to a large extent, the visibility of the solar collector is a result of the ambiguous way in which it has been perceived and discussed in Sweden since it was first introduced in the 1970s (Henning 2000). On the one hand, the solar collector in Sweden is a strong positive symbol for an environmentally benign future. On the other hand, there is a lingering insecurity concerning its present feasibility. One of the reasons for this ambiguous position is the role solar energy technologies played as an argument in the discourse surrounding the nuclear power referendum in 1980. This was a time when heated debates and conflicts concerning national energy policy tended to split families and friends all over Sweden.

Today, solar heating systems are increasingly treated in less ambivalent ways, as issues of climate and carbon dioxide emissions gain legitimacy, and as roof-integrated solar collectors gradually become a more common sight. Still, implicit conflicts in opinions and differences in how these artefacts are culturally understood, tends to leave presumptive solar collector owners with an uncertainty as to how they would be looked upon by others, were they to decide on an installation (Henning 2000). There is also an insufficient social structure of producers, installers and promoters with enough economic resources to change this situation and fully carry through the process of introduction and implementation (Edquist and Edqvist 1980; Henning 2000; Shove 2003).
Not merely solar collectors, but their users as well, are perceived differently in different cultural contexts, and cultural variation does not stop at the national border, but goes down to the habits, experiences and modes of thought that some individuals share to a larger or smaller extent with certain others (ibid.) In some places and situations, people can feel pretty sure of what their closest neighbours and friends will think of them, while in others, people may show a great concern and uncertainty as to how others will react. In a place such as Orust (the third largest Swedish island), which has become a solar collector dense area, people no longer stand out as different or signal anything special if they put collectors on their roofs. But in a village where only one installation has yet been made, people might start talking: 'He has always been a little odd. He has all that stuff in his barn, so whenever someone in the village needs a special screw or something they go to him. So when he put that solar collector on his roof, that was so typical!' (ibid.).

**Solar design, marketing and cultural values**

As with all artefacts, the ways in which solar collectors are perceived, differs between various parts of the world. They may give prestige, as in Poland or Central America. They may be seen as ugly, as in Southern Italy. Or they may be just functional, as in Greece. In Sweden, the combination of conflicts surrounding the initial introduction of solar heating, the extremely public location on the roof, and the importance put on house and home and on having an 'equal house' in a double sense of the word, has produced an uncertainty towards solar collectors.

So, which design strategy would be best suited to the purpose of marketing solar collectors in the Swedish situation of uncertainty and insecurity? Perhaps it would be best to listen to the uncertainty as to what other people might think about the looks of the collector, and strive to make it less salient? Or perhaps a better alternative would be to try and break off the insecurity by making them really conspicuous? Or maybe the design strategy should be based on the fact that solar collectors are very differently perceived in different neighbourhoods and among different groups of people? Such a strategy would, I presume, lead to a much greater variety in solar collector designs than we see in Sweden today.

My personal favourite, however, is the idea of making better use of the fact that solar collectors, through innovative design thinking, can be made into really good advertising signs for combined pellet and solar heating systems. The promotion of such combined heating systems would also be a perfect way of evading a difficult pedagogic problem in the marketing of solar heating systems in Sweden; a problem actually caused by the experience that people have of the climate in which they live. In order to produce hot water, solar collectors primarily need a clear sky, not warm outdoor temperature. This is the reason why they produce heat in the autumn and the spring when there is a great need for heating Swedish houses. However, men and women who grew up in Sweden, link sunshine with warm summers. It is hard for them to understand that indoor heat can be produced by sunshine, when outside cold northerly winds sweep along their houses (Henning 2000).
Male or female motives, responsibilities or interests for different heating systems vary (among other things) with the space in which they are placed. The location of the heating system also influences household negotiations in deciding on a change of heating system.

We have seen that women in Swedish households would rarely question the opinions of the man in such clearly traditionally male areas as the boiler-room and the task of handling a boiler with its burner and hot water store. Any man interested in installing a pellet stove in hallway, kitchen or living-room, on the other hand, would most probably have to come to an agreement with his wife in order to get his own way, since it is generally the woman who has the main interest and responsibility for creating a pleasant home in the right style, the way this is understood.

However, while in the case of the stove the man would have to come to an agreement with his wife in order to get his own way, the gender situation is quite the opposite in the case of the solar heating system. Women, who wish to have this installed in their home, tend to act indirectly through their husbands (Henning 2000). One explanation of why they do not themselves act in a more direct way, can be found in the dominant and, of course, culture specific gender role division of household responsibilities and interests. In spite of the fact that many women value solar heating systems highly, not merely for the hot water they provide but for their ability to reduce carbon dioxide emissions, for the most part they do not have the main responsibility for construction work or for the outside of the house. These are mainly the husbands’ responsibilities. A household decision on a solar heating installation depends either on the will of the man or on the woman’s ability to persuade her husband (Henning 2000).

CONCLUSIONS
In writing this chapter, an essential background was the aim of the Swedish government to reduce carbon dioxide emissions produced through the heating of residential buildings. One way of realizing these aims would be to cut down on the use of fossil fuels (which increases the production of CO₂) through a wider use of efficient stoves and boilers for bio-fuel combustion (which do not add more carbon dioxide emissions to the atmosphere than if the plants or trees had just decomposed) (Fryk 1999). Another way of realizing the aims would be to cut down on the use of any fuel through a high proportion of direct solar energy use, a solution that seems increasingly necessary for a sustainable global energy future (Weiss 2003).

Culture is not-inherent and given once and for all. Even so, the primary task for social scientists engaged in energy research, should not be to persuade individuals to change their habits in order to accept renewable energies and sustainable architecture (as has often been the case), but should rather be to help making such artefacts resonant with the habits and interests of both men and women (Carlsson-Kanyama and Lindén 2002; Henning 2003b; Nordell 2003; Shove 2003; Wilhite 2000).

For planners, architects or building contractors, engineers, designers or salesmen, the challenge is to see things from the perspective of those household members who use the buildings or heating systems. Knowing how to design a heating system that
will work is quite different from knowing how to design or market a system that users can perceive as responsive to their domestic practices and values.

The importance of socializing in a large and cosy kitchen and the importance of decorating the home so that it is experienced as warm and welcoming, are only two examples of how various spaces of a dwelling are culturally perceived and used in this part of the world. When combining culture specific ways of using and thinking of various spaces of the building with ways in which certain heating systems are handled and looked upon, we may get some clues as to what should be expected of the appearance, performance and marketing of such technologies. Thus, a 'male' boiler located in a 'female' laundry, a dusty but 'cosy' (mysig) stove located in a tidy decorated living-room, or an 'insecure' solar collector located on the public roof of the house, tell us something about the kind of interest or disinterest men and women in Swedish households could have in these heating systems.

One of my arguments has been that cultural variation in perception of heating systems based on renewable energies could inspire design thinking. Cultural analysis is, I argue, an important way for architects, engineers, designers and others involved in the development of sustainable buildings and heating systems based on renewable energies to be actively involved in setting the course towards a sustainable energy future.

Bibliography


Blid, H. 1989. Education by the People - Study Circles. Ludvika: ABF.


Fiedler, F. 2004. The state of the art of small scale pellet-based heating systems and relevant regulations in Sweden, Austria and Germany. In Renewable and Sustainable Energy Reviews. (In print).


