Energy and Lifestyle: A Comparative Analysis

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1. SYNOPSIS

A modern-urban, energy dependent, lifestyle, influenced by factors such as convenience and hygiene was found in an analysis of 1930 interviews from four different urban environments in Sweden.

2. ABSTRACT

From almost 2000 interviews, in four urban environments in Sweden, a comparative analysis, with respect to differences in value-guided energy related habits was made. A "modern-urban" lifestyle was found, guided by factors as convenience and hygiene. Energy-related habits form patterns, e.g., a positive relation between shower and washing habits. The woman forms the pattern at home, and there is some indication that these patterns are socialised to the young generation in somewhat more pronounced form. The attitude to energy consumption is, in this study, the single most important variable influencing social habits

3. BACKGROUND

In the Nordic countries a considerable proportion of the single family homes are all-electric. Sweden, Norway and Finland hold more than 500.000 homes each, and in Denmark the number is about 150.000 homes. This means that about 7 million people or about 30 % of the total population in these four countries live in this type of dwelling. If this group could to start to economise with its electricity consumption, I believe an important step towards a more energy conscious society would be taken.

To obtain this goal I agree with the belief that the rules of the game in the energy market have to be changed (Statens Energiverk, 1989). The major objects here are to convert the present limitations into means for action (Palmborg 1994). Today, the consumers get no price signal, receive poor feed-back, and lack basic knowledge about their own energy related behaviours.

In Denmark, the most progressive Nordic country in terms of energy policy, the first two limitations have been developed into means by introducing a three level tariff and installing an electronic display in the households, so that the household itself can monitor its own use and consumption in detail. This is now common practice in the two biggest utilities in Denmark, NESA and SEAS. The third limitation, an accurate knowledge about what factors and habits that guide the household energy consumption, and thereby a basis for accurate information transfer, is still not fully explored, and, thus, not implemented in the transfer of the market structure.

The means, fully implemented, can create a considerable energy economising effect. Both practical Danish experiences (NESA 1988) and analysis of the Swedish electricity market (Palmborg 1987) find an economising potential of 15-20 % of total energy use, divided equally between energy consumption reduction and redistribution of energy use. By use of proper information to the households (a topic, which so far has been neglected), I believe it is quite possible to influence about 25 % of total energy use. This means a Nordic saving potential of 2.5 TWh and another 2.5 TWh, which are transferred from peak to off-peak periods.

One way of influencing the households' energy consumption and use is to influence the values of the households. In recent years the discussion of lifestyle has been a popular subject among behavioural energy researchers, but it is an unexplored area, and the concept does not possess a clear-cut definition. One important distinction is whether we are talking about energy as an important imput to certain lifestyles, or if we really are talking about energy lifestyles (where energy consciousness guides household behaviour). In the Nordic countries, I have found no evidence for the later viewpoint, and I assume that we still are in a situation where energy is a mean to express certain lifestyles. Another problem is the definition of the concept. Researchers give different definitions to the concept lifestyle, see, e.g., Schipper et.al. (1989), Hallin (1991), Linden (1992). Personally, I will suggest that a lifestyle is a stable behavioural pattern in accordance with a set of values held by the household.

4. THE STUDY

The study is based upon Swedish data, and describes the habits of Swedish households. On the other hand, there are substantial similarities in climatic, cultural and other socio-economic factors, as well as in the electricity market, in both Sweden, Norway, Denmark, and Finland. The Swedish results, then, can be set as hypotheses for these Nordic countries.

The analysis is focused upon the energy related behavioural pattern of the households, and the principal question is if there are urban and/or geographical influences on the energy related behavioural pattern of the households.

To find some answers to the question, two previous, and in structure similar, studies by the author, (Palmborg 1986, 1987) were used. The data in these studies were collected through personal interviews with households living in four different urban settings, here called "Bigcity", "City", "Town", and "Smalltown", and these urban levels were found in four geographically different regions, ranging from the Stockholm area to the northern part of Sweden, a total distance of more than 1500 kilometres. These regions are here geographically labelled "SS", "S", "N", and "NN", see Figure 1.

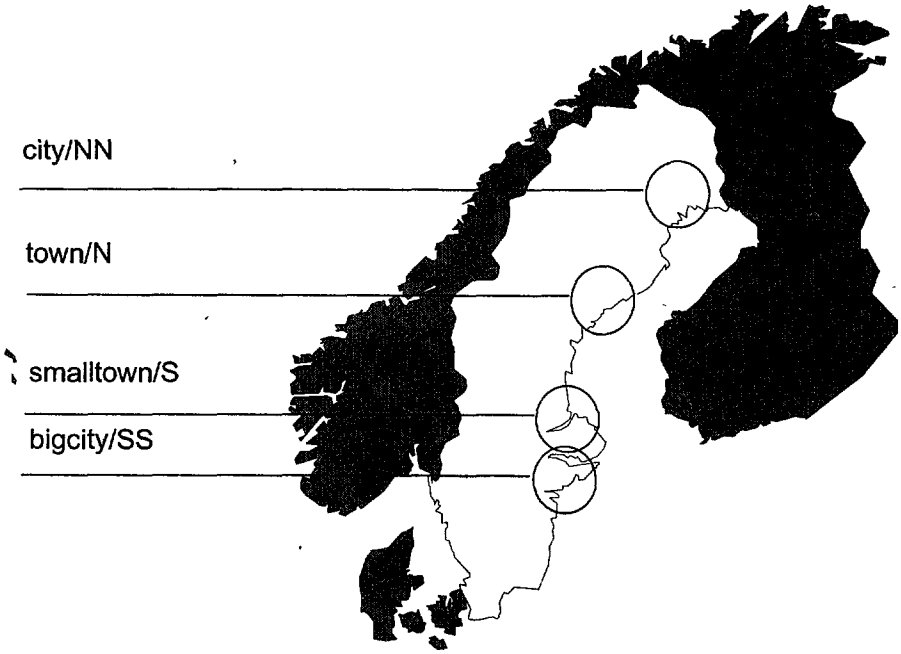

Figure 1: *The geographical distribution of the urban areas*

In all 1930 households were interviewed. Indoor temperature was measured, and data about annual water consumption was collected from the local distributor (each household has its own water meter, which is read once or twice a year by the distributor). From earlier research (Palmborg, 1986) we know that water consumption explains about 50 % of the household's energy (electricity) consumption, and variation in indoor temperature about 15 %. Annual electricity use was not used since the houses differed in size, design and age, and the climatic conditions differed considerably, which all influence basic heating. Data about different energy related habits were collected including ventilation habits. Data collection followed the model presented in Figure 2.

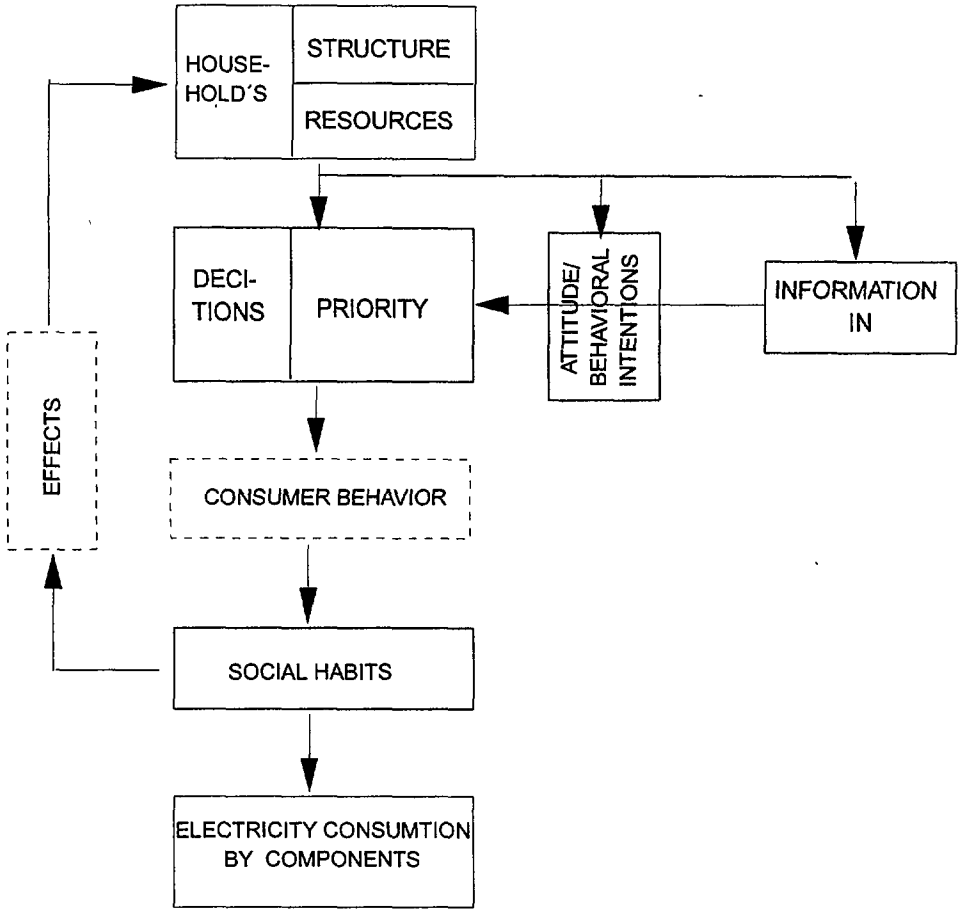

***Figure 2:** Household electricity consumption within an urban/geographic setting.*

5. RESULTS

5.1. Urban Influence

There is no relation between indoor temperature and urban level, and no relation between ventilation habits and urban level. In Figure 3 we see water consumption in different urban levels. With an increase in urbanity the water consumption increases. In Bigcity, 25 % of the households consume more than 250 m3/year. Corresponding shares are 13%, 6 %, and 10 % in City, Town and Smalltown. The result is significant on 0.0 %.

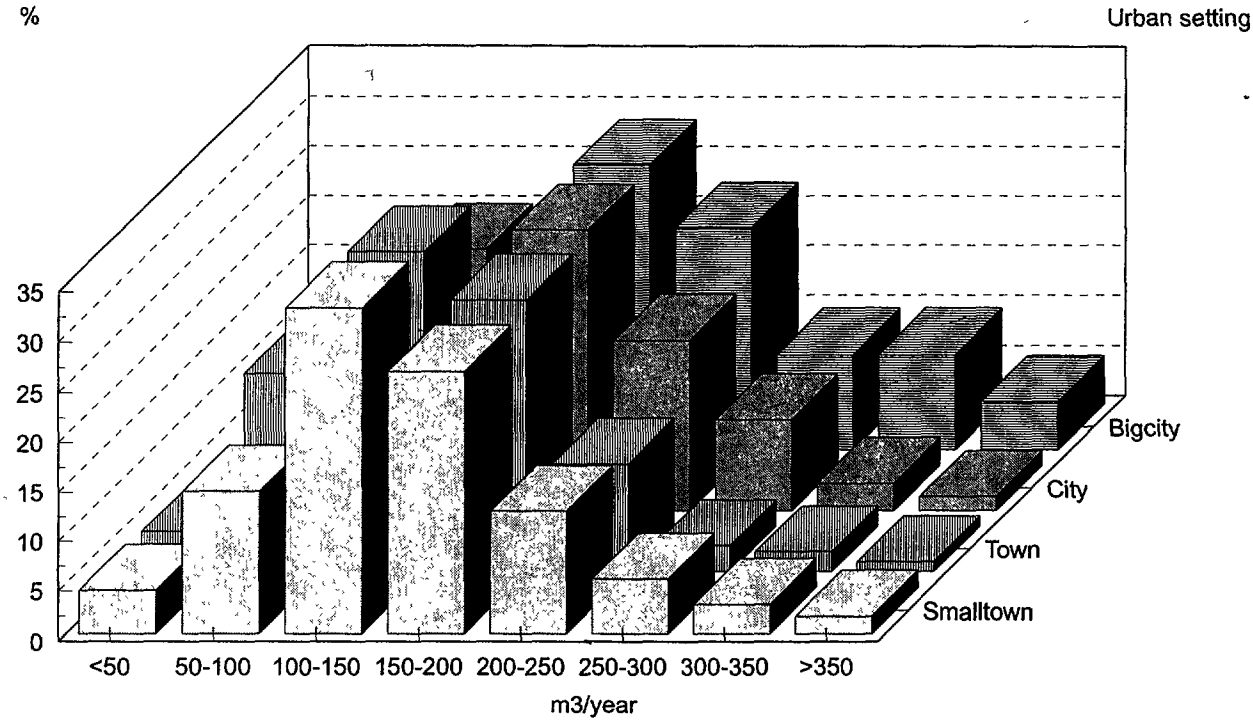

Figure 3: *Water consumption and urban setting*

Water consumption is of course influenced by the size of the household (rxy= 0.46), but if we control for household size, the most influential variable is attitude to electricity consumption (rxy= 0.22). We also see that attitude to electricity consumption, measured by the behavioural intention component (operationally defined as the percentage of lit bulbs in the home - all the interviews were made in the evenings in October to December) correlates with increased urban environment (rxy= 0.25).

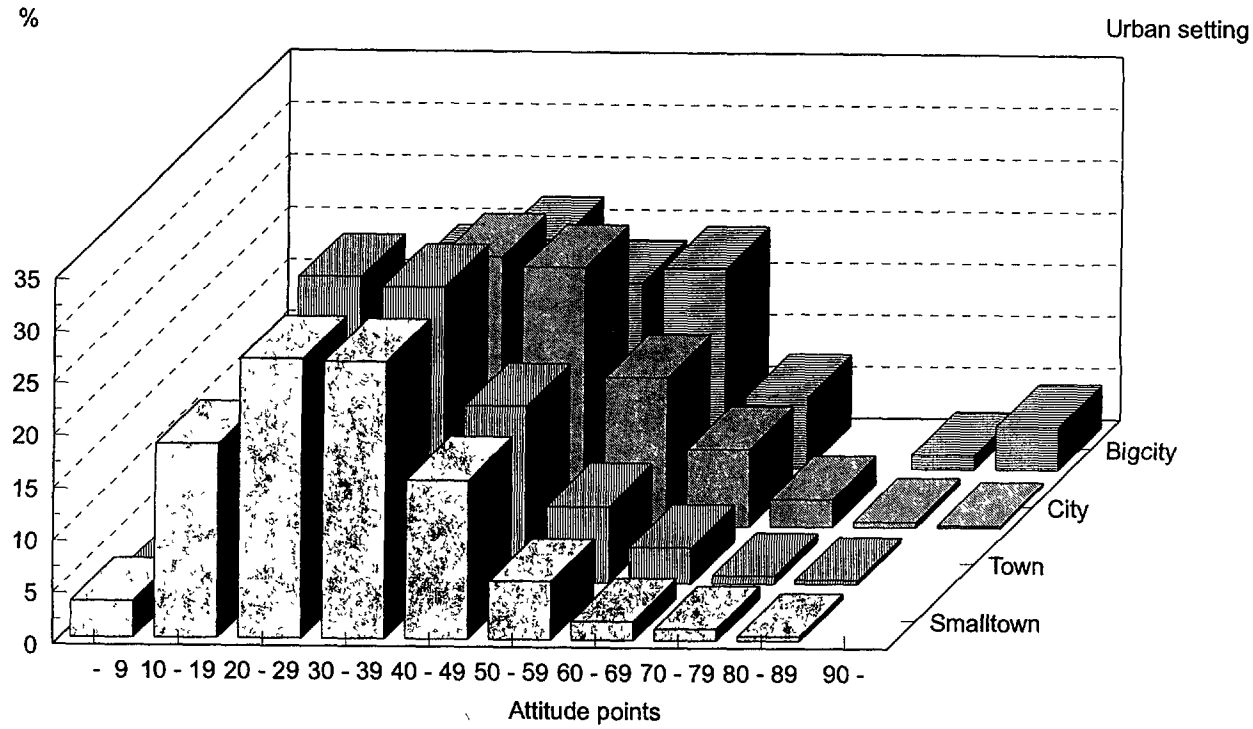

Figure 4: *Attitude to electricity consumption and urban setting.*

Mean values are; Bigcity 41.0, City 39.8, Town 33.4, and Smalltown 31.0. The deviation also increases. The proportion of households with an attitude point >=50 is in Bigcity 32 %, City 25 %, Town 12 %, and Smalltown 9 %. The attitude correlates rxy= -0.30 with household age, and rxy= 0.20 with household size. The results are significant on 0.0 %.

5.2. Geographic Influence

While there is no relation between water consumption and indoor temperature with the geographic location, we find a different pattern between ventilation habits and geographic location. Compared to water consumption and indoor temperature we cannot get a single measure of the household's ventilation, and thus we have to use measures of different habits as indicators of the household's ventilation. We can use, e.g., the household's ventilation strategy - households that open the windows fully for a short while, or households that open the windows just a fraction and let them stay so for a longer period - and label the households as effective or ineffective ventilators.

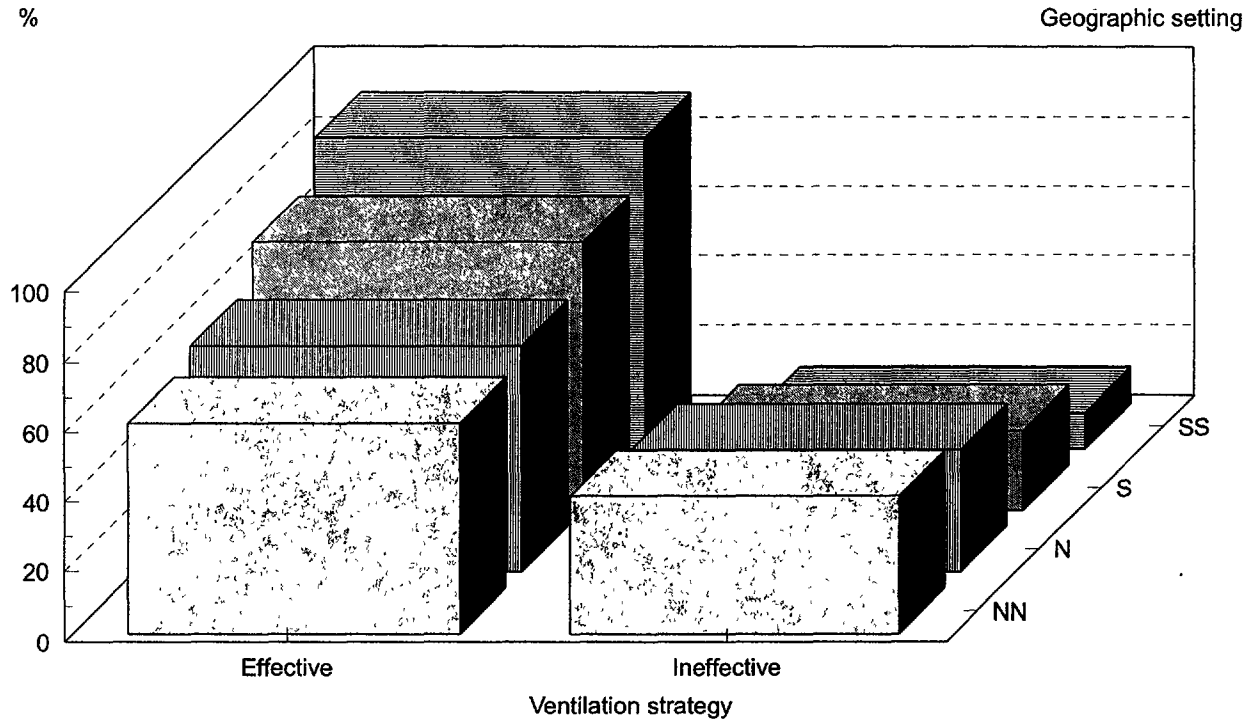

Figure 5: *Ventilation habits per geographic setting*

We see that the further the north we get a higher proportion of the households uses an ineffective ventilation strategy. Obviously, the effectiveness is held back by perceived loss of convenience. This tendency is increased if we control for household age, measured as the man's age whenever possible - otherwise the woman's. The results are significant on 0.0 %.

5.3. Social Habits and Water Consumption

The most important component in household's energy consumption, apart from the necessary use of energy for heating etc., is the use of water (Palmborg 1985). The habits related to water consumption are primarily related to hygiene and food preparation.

Data about the household's shower habits were collected during the interviews for all family members, spouses and children. There is a strong correlation rxy= 0.61 between spouses' shower habits and also between the habits of parents and children, especially between mother and children. The correlation increases with the number and age of the children. Shower frequency correlates rxy= 0.42 with the mother and eldest, or only, child. If this child is a teenager the correlation is rxy= 0.48. For families with two children the corresponding figures are rxy= 0.41 and rxy= 0.39, and if the children are teenagers rxy= 0.49 and rxy= 0.46. In Figure 6 we see that the child adopts its mother's habit in somewhat more pronounced way.

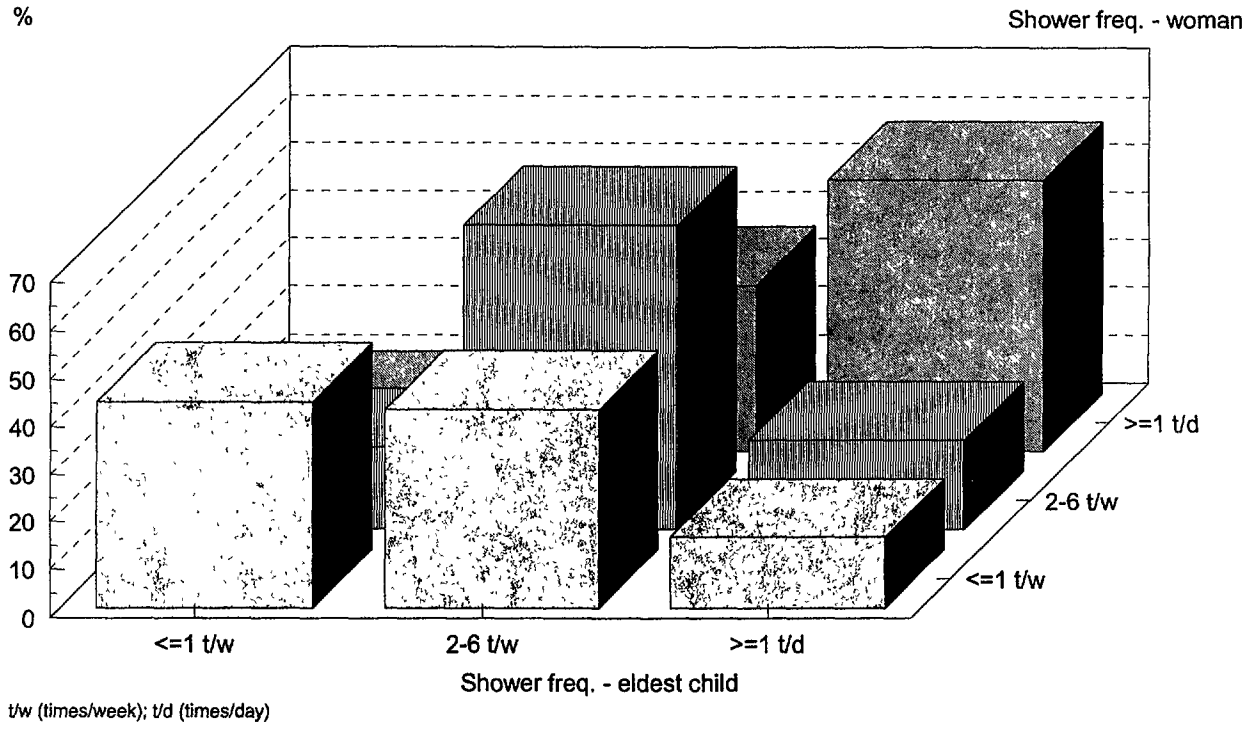

***Figure 6:** Shower frequency - woman and eldest child*

Almost all households have a dishwasher, 100 % in Bigcity, 98 % in City, 99 % in Town, and 90 % in Smalltown. Use of the dishwasher correlates with several variables, household size rxy= 0.56, household age rxy= - 0.58, income rxy= 0.35, and attitude to electricity consumption rxy= 0.28. Together, these variables explain 45 % (R2) of the variation.

The use of the dishwasher correlates with other water consuming variables. In Figure 7, we see the relation between the woman's shower frequency and the use of the dishwasher. The correlation is rxy= 0.28.

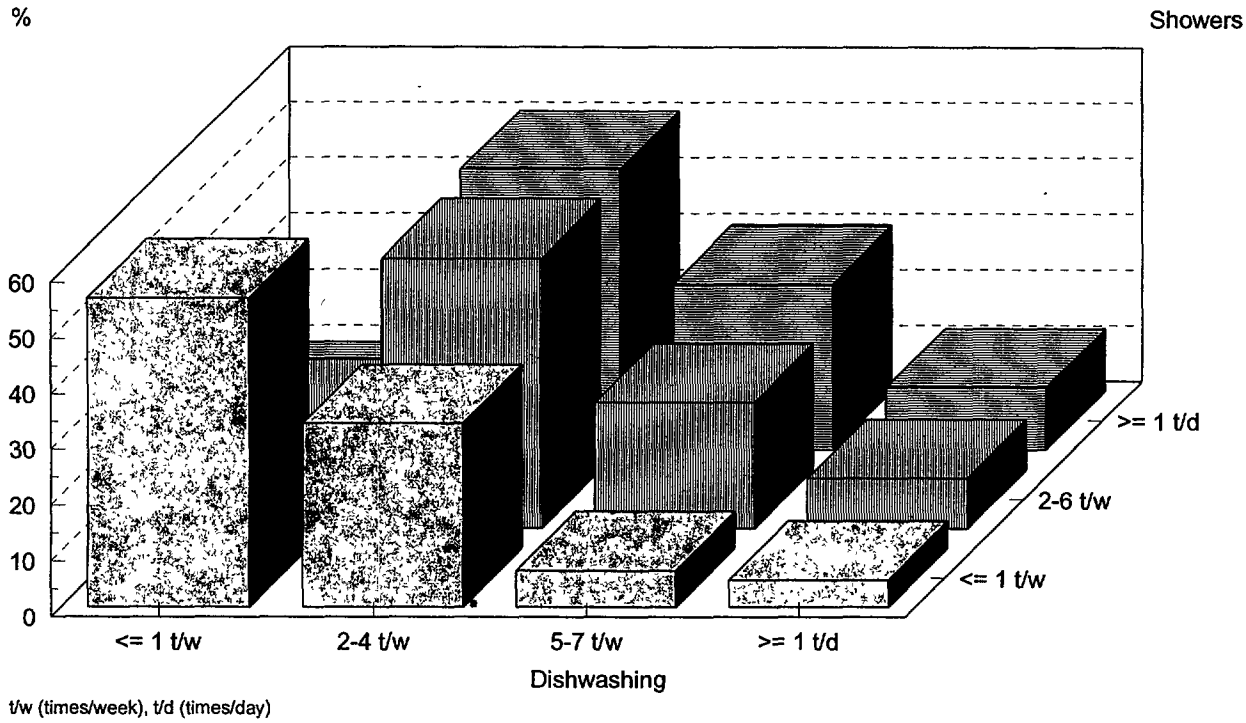

Figure 7: *Shower frequency, women, and dishwashing frequency*

To me, this indicates the beginning of a pattern, where energy consuming patterns convene along a dimension, which I call hygiene. Younger, well-educated families, with a positive attitude towards electricity consumption, emphasise their personal hygiene in their daily life, which influence both water and electricity consumption.

To do the dishes by hand are negatively correlated with shower habits, see Figure 8, attitude to energy consumption, income and education. On the other hand, we find the opposite correlation between rinsing the dishes under tap water instead of using water in the sink. I believe that these reverse relations indicate how habits change between generations.

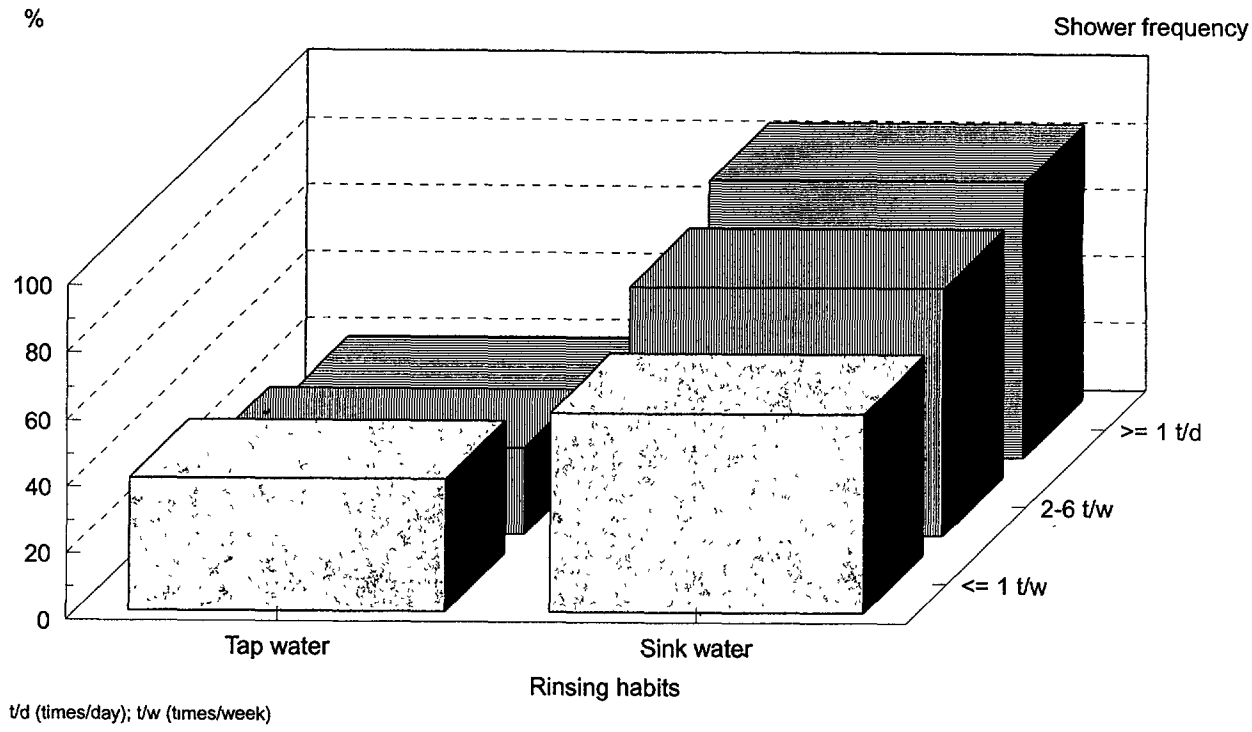

***Figure 8**: Shower frequency, women, and rinsing habits*

There seems to be a tendency, when different alternatives exist, to choose a technical and energy demanding solution. If the household chooses to do the dishes by hand, they find it more convenient to rinse under tap water. I believe that we here see another dimension, which I call convenience. Convenience is emphasised by younger, well-educated households with a more positive attitude towards energy consumption.

6. DISCUSSION

In this study electricity is looked upon as a good, comparable to other goods and thereby subject to consumption. As indicated in figure 2 household priorities, demands raised for different areas of consumption, were analysed in the study. The households show no differences in priorities between different geographical areas or urban levels except the priority of saving. This difference is not related to the energy related behavioural pattern of the households, and, more important, not related to the attitude to energy consumption. As I see it, Swedish households do not evaluate electricity from an economic point of view. Since the households received no price signal (they are e.g. billed every month based upon an estimated yearly consumption, and not upon actual use), and as the households are unable to influence their consumption due to a flat tariff, this is what to be expected.

Likewise, there is no relation between energy knowledge and household electricity consumption (two different measures of energy knowledge were used). This is also to be expected in the situation that exists. This fact gives strength to the assumption that the households do not see electricity as a good.

Energy and lifestyle, what is the connection? My conclusion is, that the habits of the households are an expression of a lifestyle based upon the use of electricity as a mean to achieve certain goals, e.g. convenience and hygiene. This "lifestyle" is influenced, among other things, by modern urban living, and includes a more positive attitude to energy consumption. I call it the modern-urban lifestyle. This lifestyle is supported by values like hygiene and convenience.

The convenience value influences ventilation habits, but not along the urban dimension. The further the north, the convenience aspect influences a less energy effective ventilation strategy. The households in the north part of Sweden tend to open their windows just a fraction, and let them stay so for a longer period.

From the data about shower habits, where data for all the family members were collected, a socialisation pattern emerges. The parents, specially the woman, transfer their shower habits to their children, and the children seems to adopt the habits in somewhat more pronounced way, they are inclined to take longer showers than their parents. If we

add the differences between younger and older households, I believe that households tend to depend more and more on electricity to meet increasing demands for convenience and hygiene.

To speak about a modern-urban lifestyle, influenced by factors as convenience and hygiene, seems to reflect modern life in a broader context, where personal fitness and an emphasis on leisure activities are predominant factors.

The principal question was if there were any urban and/or geographical influences on the energy related behavioural pattern of the households. The findings indicate that especially the urban dimension influences values, attitude, and energy related behavioural pattern.

8. ACKNOWLEDGEMENTS

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