Energy efficiency in Norwegian households – identifying motivators and barriers with a focus group approach

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Abstract: This paper describes the theoretical background and results of a focus group study on determinants of energy related behaviour in Norwegian households. 70 Norwegians between 18 and 79 years of age participated in eight focus-groups in four Norwegian cities. The aim of the study was to identify behaviours that Norwegians consider relevant with respect to energy use, the main determinants of those behaviours, as well as barriers against and facilitators of energy efficiency. The most important behaviours from the participants' perspectives were heating, water heating, use of white ware and mobility. The main motivators named were minimising behavioural costs, value orientations, perceived consumer efficacy and social norms. The most important barriers were structural misfits, economic, effort, time consumption, low consumer efficacy and lack of relevant and trustworthy information. The most potent facilitators were economic incentives, gains in comfort, reduced effort, tailored practical information, individual feedback and legislative actions.

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1 Introduction

Because of global climate change and an uncertain primary energy source supply, the focus has been directed to energy use in many countries (e.g., European Commission, 2011), Norway being one among them (Norwegian Ministry of the Environment, 2002). In dealing with the climate and energy supply crisis, three main strategies can be applied:

a decrease the need for energy

b increase energy efficiency

c diversify energy supply and increase the utilisation of renewable energy carriers.

A forth alternative (increasing energy production) is often perceived as counter-effective (European Commission, 2011).

Within the energy use of a country, household behaviour is of crucial importance (Hertwich and Peters, 2009; Mullaly, 1998): households consume energy both directly (for heating, electronic devices and mobility) and indirectly (through consumption of products). Stern (2000) outlines that a household's energy use is affected both by patterns of everyday behaviour (e.g., the way the door to the refrigerator is opened) as well as singular decisions about investments (e.g., about the type of car or a refurbishment of the house with upgrade of the insulation standards). The factors that have been shown to

impact such behaviours are diverse and differ between the types of behaviour and between people (Black et al., 1985). To develop effective strategies to influence people's behaviour, a solid understanding of its determinants is a prerequisite.

In this study, we analyse households' perceptions of motivators and barriers in Norway as a case study. On the one hand, Norway has some peculiarities in the energy market that makes it an interesting focus of analysis. According to Statistics Norway (2012), the country has a high proportion of electricity in the mix of total energy used (49.0% in 2011). In households the fraction of electricity is even higher (about 80% of stationary energy use – excluding transport). In 2011, 60.8% of the total energy used was produced from renewable sources (mostly hydropower), the amount of renewable electricity varies extremely based on precipitation and use patterns. In the dry year 2010 with a long cold winter, 90% of the electricity used in Norway was produced from renewable sources. In 2011, which had a warm winter and high precipitation, more electricity was produced from renewable sources than was used in Norway, which technically resulted in 100% renewable electricity on average across the year. Norway's water power is a valued good on the Central European market, especially now that other energy sources such as nuclear power are phasing out in some countries. Easy access to electricity and prices below the European market prices (although rising since 2000 and having higher volatility since the market deregulation in 1991) has created a structural setting in which households are heavily relying on electricity for stationary energy use. This made Norway to one of the countries with the highest per capita use of electricity in the world. At the same time, Norway is a country with long distances between the larger settlements and the topography makes it challenging to base the resulting mobility on renewable energy sources. This special situation has an impact on motivators and barriers people might perceive in their attempts to increase energy efficiency. On the other hand, Norwegian society is a good example of a Western lifestyle with high levels of mobility and consumption and can thus be of interest beyond the peculiarities described above.

2 Identifying determinants of energy behaviour

In this paper household energy behaviour is understood as a decision made by the decision maker (household) that affects the direct energy use (stationary, mobility) of the decision maker. Energy behavior manifests itself in purchase choices (appliances, energy related goods), investment decisions (house, car) or daily habits (lighting and water use, room temperature). Several theoretical approaches have been taken to explain household energy behaviour. Two of them will be discussed in the next two sections.

2.1 A socio-economical approach

The socio-economic tradition of energy research has for a long time focused on identifying extra-personal factors that impact the energy use of a household. Factors such as annual income, dwelling type, size and standard, family size, employment status and geographical location have for example been identified to impact heating expenditures in a study by Meier and Rehdanz (2010). Brounen et al. (2011) also found structural dwelling characteristics such as age, type and quality as the main determinants of energy use for heating, while income and family composition determine electricity for other purposes. An interesting finding is that households with children, especially teenagers,

use significantly more electricity than household without children. In a literature review article, Mundaca et al. (2010) described key determinants of household investments in different types of technologies: for electrical appliances such as refrigerators, dishwashers or tumble dryers, their size, brand (which indicates quality standards), purchase costs and the household income are most relevant, whereas investments into the building standard (insulation of walls, roof or windows as well as heating/cooling equipment) are driven by comfort, reduction of noise, purchase and operating costs, aesthetic appearance, the timing of the decision and the income level. Investments in lighting systems are mostly driven by design and aesthetics, availability, compatibility, performance, safety, quality and purchase/operating costs.

2.2 A psychological approach

In contrast to the aforementioned studies, the environmental psychological research tradition aims to identify intra-personal determinants of energy behaviour, mostly by proposing an action model that combines the identified determinants in a systematic way. The most common is the theory of planned behaviour (Ajzen, 1991). Although the model has received empirical support in many studies about energy related behaviours (e.g., Laudenslager et al., 2004; Han et al., 2010; de Groot and Steg, 2007), it has also been criticised for being too narrow in domains that are characterised by behavioural routines. It has been argued that everyday behaviour tends to become a routine or habit when repeated often enough, successfully in stable situational conditions (Verplanken and Aarts, 1999). If that is the case, the influence of intentional processes should diminish. Another aspect that is not explicitly included in the theory of planned behaviour is how external facilitators or barriers like the ones described in the previous section interfere with intentional processes. To take both aspects into account, an extended version of the theory of planned behaviour (see Figure 1) has been proposed in the 'Behave' project (Egmond and Bruel, 2007) which combined experiences from energy efficiency agencies from ten different countries. The core constructs of the original TPB are printed in grey in the figure and the basic assumption is that behaviour of people is determined by the intention to perform it. This intention in turn is a combination of the attitudes towards this behaviour, the perceived social pressure (social norms, referred to as subjective norms in the original TPB), and self-efficacy. Self-efficacy is the feeling of being capable of performing the intended behaviour and the ability to perform it.[1] The original TPB was extended by three aspects to form the version displayed in Figure 1:

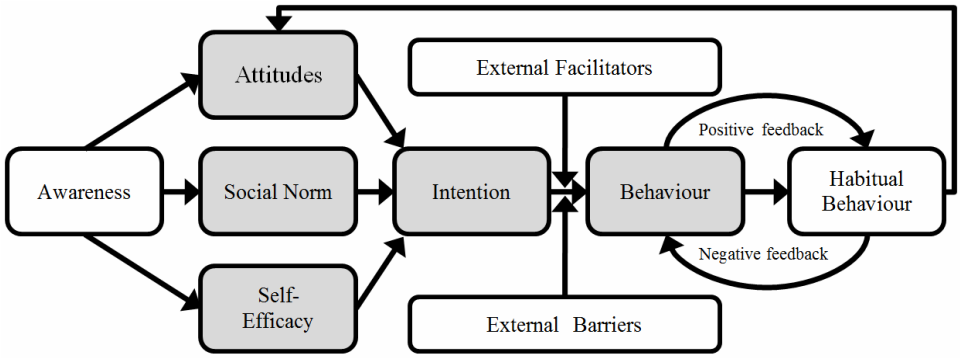
a it is assumed that awareness of energy related problems is a prerequisite of the activation of attitudes, social norms and self-efficacy

b external facilitators and external barriers are assumed to moderate the relation between intentions and behavior

c frequently repeated behaviour is assumed to habitualise and therefore create a barrier to change (Verplanken and Wood, 2006).

Behaviour is assumed to have a feedback on attitudes (Bem, 1972). Furthermore, a potential mismatch between behaviour and attitudes might induce effort to change behaviour.

Figure 1 An extended theory of planned behaviour as a theoretically derived model for energy behaviour (Egmond and Bruel, 2007); grey boxes are based on the original version of the model as presented in Ajzen (1991)



2.3 The present study

Since the research traditions sketched in the two previous sections have coexisted for some time, the question may be raised if they can be combined fruitfully. One way of doing that would be to understand the socio-economic environment to act as a set of potential external facilitators or barriers. Therefore, the present study has as one research question whether what people experience as barriers or facilitators of their energy behaviour is related to aspects identified in the socio-economic approach. Here the specificities of the Norwegian energy market as well as the geographical demands might become relevant. A second research question is whether the proposed framework model based on an extended version of the theory of planned behaviour receives support by the participants, which means if they name or in other ways reveal variables that can be related to the constructs included in the model. Finally, an aim of the study is to find out what kind of behaviours the participants perceive as being energy related. This is important as it can be assumed that the understanding and acceptance of energy consumption focused policies (e.g., new incentive programmes or regulations) are related to consumers' perceptions of relevant factors from their own consumer perspective (see Steg et al., 2006). Moreover is an analysis of the subjectively perceived barriers and motivators for energy efficient behaviours a first step in identifying relevant starting points for campaigns and structural interventions to improve energy efficient behaviours in Norway.

3 Method

In total, eight focus-groups in four Norwegian towns were conducted. The towns selected were the four major cities in eastern, western, central and northern Norway, namely Oslo, Bergen, Trondheim and Tromsø, respectively. The four towns were selected to represent the geographical differences of the regions in Norway. In each town, two focus-group discussions were conducted, one with people living in the city

centre and one living in the more rural areas around the city. Participants were recruited by a newspaper advertisement in the local newspapers with the largest share in the regions. Participants were offered 1,000 Norwegian crowns (approximately 130 Euro) as reimbursement for their efforts (both time and travel). Interested participants were asked to take contact to the research team by e-mail or phone and a screening of the participants was conducted (background data about the living conditions such as job situation, age, family size, type of dwelling, etc.). The focus groups were composed based on several factors such as: a large variety of living conditions, including singles, couples, families with small children, teenagers and grown up children, house owners, apartment owners, people renting, employed, unemployed and retired people as well as students. Presumably due to the offered monetary incentive, students and unemployed people were overrepresented in the group of about 120 interested people who contacted the research team but the variation in the group was large enough to compose varied groups.

The focus group interviews which were video- and audio taped were conducted in the first two weeks of June 2011 during the afternoon and evening hours and lasted for about 2 to 2.5 hours. The project was approved by the Norwegian data protection agency and the participants were instructed about the research background, their rights to withdraw at any point and the handling of the data both via e-mail in the days before the interview and a second time immediately before the interviews started. Two members of the research team moderated the focus-group discussions. Afterwards, the focus groups were transcribed from the video/audio material for further analysis. In the following sections, the sample, the interview guide and the analysis strategy are outlined in more detail.

3.1 Sample

Table 1 displays the descriptive characteristics of the sample. In total 70 people between 18 and 79 years of age participated in the interviews. The mean age was 43 years. Half of the sample was assigned to the inner city groups and half to the rural surroundings groups. Group size was between eight and ten participants. The majority of participants were employed, but pensioners, students, unemployed people and people in maternity leave were also represented in the sample. Slightly more women than men participated. Most of the participants were married or in a partnership, but also singles, divorcees and widowers were included in the sample. As typical for Norway (Statistics Norway, 2008a), most of the participants were living in houses that they owned but also people living in apartments and people renting were included to get their perspectives into the discussions. The size of the dwellings were between 22 and 280 square meter with an average of 120 square metre which again is typical for Norway (Statistics Norway, 2008b). The dwelling's age varied between a couple of months and 130 years (average 38 years). The sample is not a representative sample of the Norwegian population as it over-represents for example students, people living in apartments, people renting, unemployed people, etc. However, it was not an aim to recruit a representative sample but to achieve heterogeneity with respect to socio-demographic variables shown to be relevant for energy consumption, such as annual income, dwelling type, family size, employment status and geographical location.

Table 1 Descriptive statistics of the sample

	Trondheim	*Tromsø*	*Bergen*	*Oslo*	*Total*
Participants	17	17	18	18	70
Living in the city	9	9	8	9	35
Living in the surroundings	8	8	10	9	35
Female	52.9%	64.7%	44.4%	55.6%	54.3%
Mean age (SD)	35.5 (11.9)	42.9 (13.3)	45.0 (15.3)	47.3 (13.5)	42.7 (13.5)
Number of children (SD)	1,8 (1.5)	1.2 (0.8)	1.6 (1.5)	1.3 (0.9)	1.5 (1.3)
Employed	47.1%	62.5%	61.1%	50.0%	55.1%
Self-employed	5.9%	6.3%	11.1%	11.1%	8.7%
Student	35.3%	12.5%	11.1%	5.6%	15.9%
Pensioners	5.9%	12.5%	16.7%	11.1%	11.6%
Unemployed	5.9%	6.3%	0.0%	16.7%	7.2%
Maternity leave	0.0%	0.0%	0.0%	5.6%	1.4%
Married/partnership	64.7%	47.1%	66.7%	61.1%	60.0%
Apartment	52.9%	52.9%	38.9%	38.9%	45.7%
House	47.1%	47.1%	61.1%	61.1%	54.3%
Renting	29.4%	29.4%	16.7%	22.2%	24.3%
Size of the dwelling (SD)	107.1 (55.6)	112.9 (63.7)	133.2 (75.7)	128.5 (62.1)	119.5 (63.8)
Age of the dwelling (SD)	43.8 (30.1)	29.1 (17.6)	43.4 (33.1)	31.9 (22.7)	37.5 (27.2)

3.2 Interview guide

The focus group interviews were conducted by using a semi structured interview guide. The main focus was to get the participants to communicate about their personal representations of their energy behaviour, their reasoning about causes, barriers and facilitators, and their perception of the typical Norwegian energy culture. To predefine the answers of people as little as possible and create openness, the interviews were structured in a way that they started with very open, broad questions and progressed towards more detailed questions in the course of the interview. The following sections were included in the interview guide:

1 Introduction of the study, the research team and the participants rights.

2 Explanation by the research team that the understanding of ‘energy’ in this study is broader than ‘electricity use’.

3 Opening round where everyone briefly introduces him/herself with respect to energy use (living situation, what are the big fractions of energy use, what causes that, etc.).

4 Exploring Norwegian energy culture.

5 How and with whom is energy use discussed?

6 Barriers and facilitators to energy efficient behaviour (both everyday behaviour and investments).

7 Brief discussion about factors that were identified as influential in other studies about energy behaviour (structural impacts, income, awareness, attitudes, values, habits, belief in effectiveness, self-efficacy, social norms, descriptive norms, energy prices, energy mix, and perceived control).

8 Debriefing and thanking the participants.

3.3 Analysis strategy

After transcription, the material was analysed by means of a content analysis (Krippendorff and Bock, 2008) in the following steps:

1 Dividing the raw material into sections such as 'energy behaviour', 'psychological impacts', 'barriers', or 'facilitators'. Passages of the text in the raw material could be referenced to more than one of these sections.

2 Screening of the text for possible categories that were named in the sections.

3 Representing a preliminary category structure within each section visually.

4 Analysing quantitatively the occurrence of each category in the eight focus groups in a second run through the material (the figures and tables in the result section are the display of this activity).

The focus of the analysis was the focus group level and to identify dominating themes in the discussions and at the same time peculiarities in the local groups or with respect to groups of participants.

4 Results

The results are presented structured by the topics that are analysed:

a categories and sub-categories of energy behaviour the participants considered

b match between the proposed framework model and the representations of the participants

c relevant barriers

d relevant facilitators.

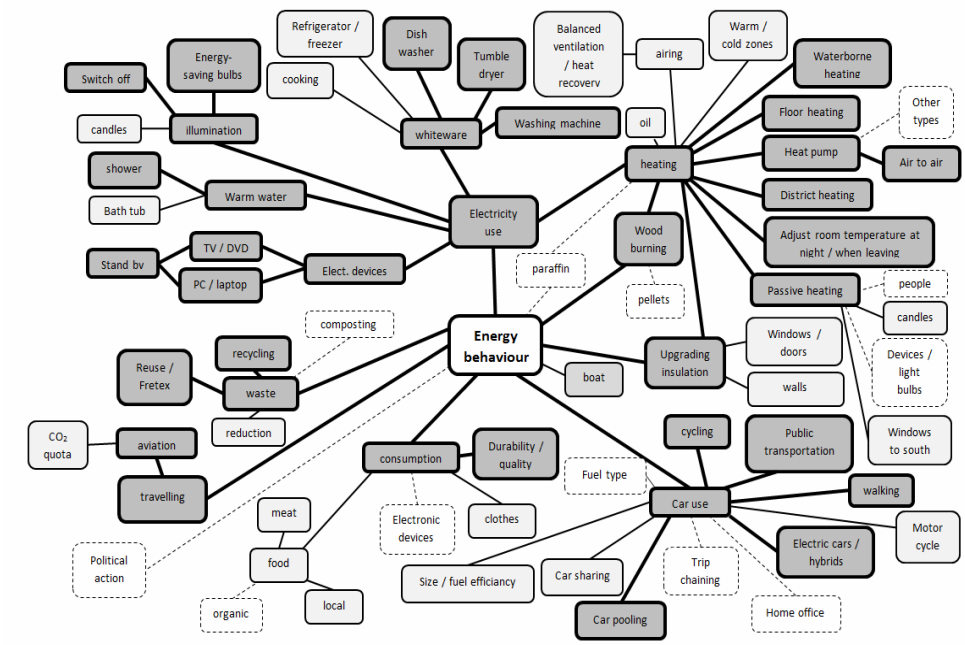
4.1 Categories of energy behaviour

Figure 2 displays the types of behaviours that have been mentioned by the participants clustered by the authors. It has to be kept in mind that they were instructed by the interview hosts to think beyond electricity use and also include other types of energy carriers like wood, oil, gas or fuel.

The two most prominent clusters in Figure 2 are clearly electricity and car use. Less distinct but still mentioned in at least five focus groups were upgrading house insulation,

household consumption, long distance travelling and waste treatment. Interestingly, the complexity of the mentioned main topics reflected the real distribution of energy used in Norway on the respective sectors to a large extent (Hertwich and Peters, 2009; Hertwich and Roux, 2011): heating (including the related upgrade of insulation) and car use were the most differentiated areas with respect to diversity of reported behaviours. The use of white ware as an subtopic of electricity use was another strongly differentiated area, whereas consumption and long-distance travelling (including holidays) were both not very differentiated compared to their real share in the Norwegian energy use patterns (Hertwich and Peters, 2009; Hertwich and Roux, 2011). Water heating in households was not very complex, but was mentioned very often in the interviews and thereby reflected its importance. Illumination was mentioned more often than its share of energy use would justify.

Figure 2 A typology of mentioned energy behaviors

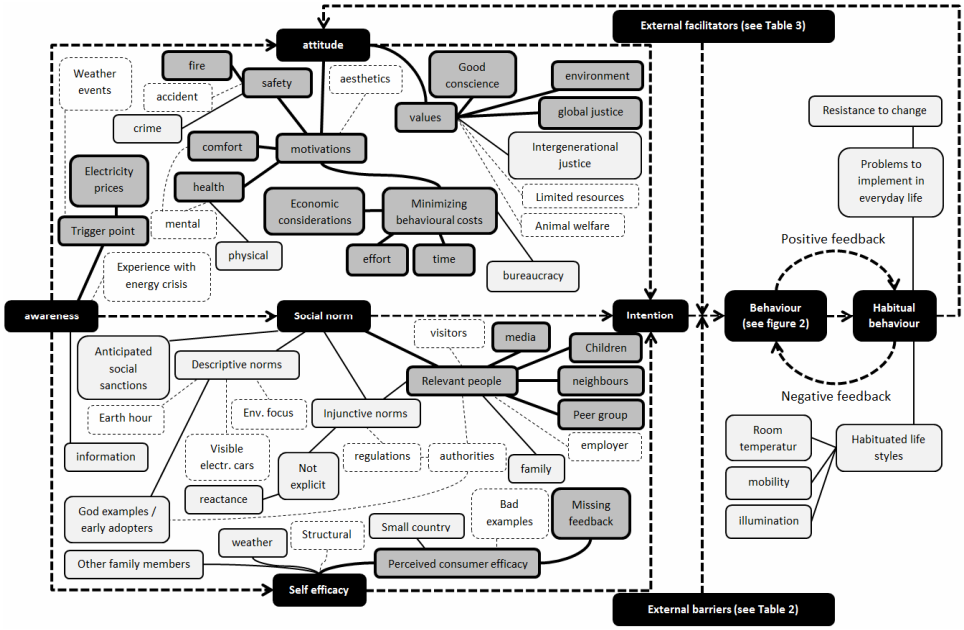


Notes: White boxes = named in one or two groups; light grey boxes = named in three or four groups; dark grey boxes = named in five or more groups

4.2 *Fit of the theoretical framework model*

In this section, the statements of participants concerning psychological impacts on energy behaviour were categorised according to how they fitted within the framework model presented in the theoretical background (see Figure 1). The aim was to see how far participants referred to the model constructs even if not naming them in the way a psychologist would use them. Figure 3 shows how the statements were arranged and linked to model constructs.

Figure 3 Perceived psychological impacts on energy behaviour



Notes: White boxes = named in one or two groups; light grey boxes = named in three or four groups, dark grey boxes = named in five or more groups, black boxes = theoretical model constructs (see Figure 1)

First, it has to be stated that the only constructs that were directly mentioned were attitudes, awareness about energy related environmental problems and habits. Intentions were not referred to at all in the interviews and self-efficacy and social norms rather indirectly. The mental representations of an attitude among the participants were much fuzzier than the understanding of attitude social psychologists would use. Participants named both a large bundle of different motivations (like minimising behavioural costs such as time, money or effort, improving health, increasing comfort or safety) as well as value orientations under the headline of attitudes and how they impact behaviour. It seems like the attitudes towards energy effectiveness were mostly impacted by value orientations like environmental values, valuing justice in the global context or between generations or simply anticipating a good conscience on the one hand and interfering motivations (minimising costs, maximising comfort) as well as potentially facilitating motivations that are not energy related (increasing health and safety, especially fire safety) on the other. The insight into the limitation of resources or animal welfare wereless important for most as were aesthetic considerations. In simple words, people described positive attitudes towards things that were in line with their environmental and social values (if they had them), that were easy and effortless to implement, that increased their comfort and potentially had positive side effects on safety and health.

Without naming it that way, people differentiated the impact of social norms into descriptive norms, which means what other people around them do, and injunctive norms, which means what others tell them is acceptable. Descriptive norms in the field of energy behaviour were relatively weak since most participants did not perceive their social environment as acting very energy saving. Good examples, however, were

recognised: people that successfully try new technology or new ways of living (who might therefore also be called early adopters). This was especially true if these people were connected to authorities. The increasing environmental focus in the media, events like earth hour or the increasing visibility of electric cars were also a part of descriptive norms, although their impact seemed to be weak. Injunctive norms on the other hand were also not perceived as particularly strong; some people anticipated even that they would react with reactance if they were. Legal regulations were, however, perceived by some as a way of society to express social expectations. Some people described anticipating social sanctions ('people would look at me') as a powerful motivator of not doing certain behaviour (like buying a SUV or leaving behind the packaging in store). Most interesting with respect to social norms was, who was named as the most influential actors: Most people referred to pressure from their own children as most effective, but also named media, neighbours and friends or colleagues. Other family members than children were only sometimes mentioned, visitors, the employer or authorities even less frequent.

Awareness about environmental problems was mostly referred to without further elaboration, for example when participants talk about missing awareness of Norwegians compared to other countries. What often was described was that awareness was triggered at a specific point in time, for example by extraordinarily high energy prices or impressive weather events that are equated with climate change. Information was seen as generally awareness-raising. Some people referred to that they have more awareness about energy problems because they had experience with the energy crisis in the 70s.

Self-efficacy was most strongly described by the participants as a (missing) belief in that behaviour change had an impact, something that could be described as low perceived consumer efficacy. This perceived consumer efficacy was diminished by missing feedback about the effects, bad examples (mostly from the waste treatment domain) and living in a country (or a part of a country) that has so few inhabitants that it hardly counts in the big picture. Furthermore, was self-efficacy affected by structural barriers, weather effects, and that other family members might interfere with one's own good intentions.

Habits were named by some participants as an impact on their ability to change behaviour, especially with respect to everyday behaviour and routines. In making these references, the participants came very close to the psychological understanding of habits. There was however also a second understanding of habits, more in the biological sense of life styles. Therefore, some participants referred to habits as common life styles of Norwegians with high room temperatures, high mobility and high levels of illumination.

4.3 Relevant barriers

Table 2 displays the perceived barriers named by the participants. They were structured into the four main types of structural/technical barriers, motivational barriers, informational barriers and economic barriers. Social barriers were barely mentioned and thus left out of the table. All four categories of barriers were strongly differentiated within. This was especially true for the structural or technical barriers, which showed very few dominating topics. The most relevant structural barriers named were geographical demands, for example the cold climate which creates a higher heating demand. Also the light situation in wintertime was related to this aspect. Family situation (size of the family, babies, teenagers or old family members which cause extraordinary need for energy), the building structure (its age, size, type and status of ownership), job

demands and technical or structural disadvantages of the alternative behaviour (e.g., problems with energy saving light-bulbs, poor quality of cycle lanes or poor connections with public transport) have been discussed in addition. The family situation (e.g., children, old family members) was also perceived as a relevant barrier to improvements in energy use.

Table 2 Most relevant barriers named by the participants

Main category	*Most important under-categories*
Economic barriers	De-individualised accounting
	Lack of investment money
	Price premium on the less energy consuming product
	Too long or low payback rates of the investment
Motivational barriers	Too much effort
	Too time consuming
	Loss of comfort
	Low perceived consumer efficacy
	Bad examples
Structural/technical barriers	Geography (light, climate, rurality)
	Family situation (size, babies, teenagers)
	Building structure (age, size, type, ownership status)
	Job demands
	Technical or structural disadvantage of the alternative
Informational barriers	Lack of (specific) information
	Uncertainty because of contradictory information
	No feedback about effects
	Lack of trust

Barriers on the motivational side were more clearly structured: high effort of behaviour (e.g., bureaucratic procedures to get subsidy) was a main barrier, also time consumption and loss of comfort were two important barriers. If people remembered bad examples from a remotely related area (e.g., waste treatment) this reduced motivation effectively. Also a low perceived consumer efficacy was a motivational problem: if people did not believe that their action made a difference (for example because the number of Norwegians in total or the number of people living in the north is so limited), they did not act. With respect to the specific situation on the Norwegian electricity market, some participants mentioned the high fraction of renewable energy as a motivational barrier because the need to save electricity is not seen. However, this aspect was not mentioned prominently in the focus group discussions. On the economic side four aspects dominated the barrier discussion:

a lack of available money to invest as a main barrier against larger investments

b doubting the payback rate of the investment because the payback is either not big enough or stretches too long into the future

c price premiums that have to be paid

d de-individualised accounting of energy costs (e.g., electricity or heating expenses included in the rent) which reduced the motivation to save.

With respect to informational barriers, a general lack of information was constituted by some people, whereas others questioned more the form of the provided information. The participants were missing feedback on the effects of their efforts, named uncertainty or contradictory of different sources as a barrier, or described the lack of trust in the communicator as a barrier (because a large number of institutions were perceived as interest groups who spread propaganda by a significant fraction of the participants). The provided information was furthermore often too complex, too scattered across different sources, too technical (based on numbers), too abstract, too economical, or it is too much effort to get it.

4.4 Relevant facilitators

Complementary to the perceived barriers, perceived facilitators of energy efficiency have been listed in Table 3. The same main categories as in Table 2 have been used. The most striking first finding is that as opposed to barriers structural/technical facilitators have hardly been named (and if so mainly as barriers against unwanted behaviours). Social/societal facilitators on the other hand were much more diverse and relevant than social barriers.

Table 3 Most relevant facilitators named by the participants

Main category	*Most important under-categories*
Economic facilitators	Available investment money
	Incentives (e.g., tax reduction, price reductions, subsidy)
	High energy prices
	Penalties on unwanted behaviour
Motivational facilitators	Pro-environmental values/attitudes/climate change
	Low effort/simple behaviour
	Saving time
	Gaining comfort
	High quality
	Additional benefits (e.g., health, safety)
	Belief in consumer power
Structural/technical facilitators	Easy access
	Disadvantage of the damaging alternative
Informational facilitators	Practical/procedural knowledge
	Feedback about effects
	Tailored, simple and effortless information
	General education
Social/societal facilitators	Legislation
	Pressure from own children
	Good examples
	Competition
	Group action

Many people named first of all economic facilitators when asked what could motivate them to more energy efficiency. Some of them were very vague on that, while others specified more by stating that monetary incentives, subsidy, tax reductions or economic rewards for low usage would motivate them. High energy prices and penalties for unwanted behaviour (e.g., an overuse tax on electricity) would be negative facilitators by being barriers to the unwanted alternative. Finally, the availability of investment money or at least legibility for a credit were important facilitators for big investments. On the motivational side value orientations as described under the psychological determinants were powerful facilitators, but also effortlessness, simplicity of the behaviour, getting more comfort or saving time. Awareness was perceived as an important facilitator by many, which could be triggered by climate change discussions (given that the person believed in human made climate change, which was a question of trust), weather events (which were confused with climate change by many people), or the insight into limitation of resources. Positive effects on health and safety were welcomed side effects which increased the motivation to act energy efficiently. The same was true for getting a high quality product (e.g., a high quality washing machine that at the same time was more energy efficient). Contrary to low consumer efficacy, belief in consumer power did motivate people to act. Information could be a facilitator of energy efficiency if access was effortless (all in one place), if direct feedback about aggregated effects was included which was comprehensible and not only numbers, and if the provided information was practical or procedural, telling people exactly what to do and how it works, in the best case about actions that did not even cost money. Lifting the education level in general was understood as a potential facilitator of pro-environmental action as more complex relations become understandable.

Social or societal facilitators were most of all legislative measures. It was surprising, how many people positively argued for stricter limits or even rationing. It should however be noted that some people strongly reacted against such legislative approaches. Pressure from one's own children was evaluated as a very positive social facilitator, also good examples of functioning pilot implementations (for example by authorities or industry), which were models or could be called early adopters. Most people were very outspoken about that they did not like to be the early adopters but rather waited until viability of an approach had been proven. Competition seemed to be a powerful social motivator as well as action in a group of people, which also counteracted low perceived consumer efficacy. Easy access to alternatives was the main structural/technical facilitator. What defined easy access can most easily be clarified as the absence of the respective barriers for the same alternative. Another structural facilitator was actually putting up barriers for the unwanted behaviour (e.g., limits on parking space, congestion).

5 Discussion

5.1 Discussion of the results

The focus group study of energy behaviour in Norwegian households brought valuable insights into what kind of behaviours Norwegians focus on, when they think about energy behaviour, what kind of psychological determinants of their behaviour they perceive, and what they experience as barriers and facilitators towards more energy efficiency. Some of those findings are specific for Norway (e.g., the ones relating to challenges caused by

northern climate), but most seem to be generalisable to other countries, at least in the western culture.

The mental map of energy relevant behaviours is surprisingly detailed in many domains and has the most details in two domains that also have a large impact on energy use: heating and mobility (Hertwich and Peters, 2009; Hertwich and Roux, 2011). Heating is usually discussed with reference to the heating system employed. Heating by electric resistance heaters is perceived as energy consuming, especially when used as floor heating. Popular alternatives are wood heating and heat pumps. Many participants discussed questions of insulation, airing systems or behaviour, passive heating by sunshine through the windows, electronic devices, people or candles and advantages of waterborne heating systems. In those discussions they displayed a high level of awareness. Transportation was discussed mainly with respect to car use and in relation to barriers against the use of alternatives (mainly public transportation, the bicycle or walking). But also other alternatives to reduce car use were discussed like trip chaining, car sharing or car-pooling. What became obvious was that most alternatives are perceived as difficult by many participants, although cycling has a rather positive status because of its health effects. With exception from the two groups from the inner cities of Oslo and Bergen, public transportation was perceived as inconvenient and not suitable by almost all participants.

With respect to the psychological framework model presented in the theoretical background, the analysis confirms large sections of it but shows the necessity to extend and refine the model. The participants were naming aspects referring to all model variables but intentions, which may be expected theoretically, because the intention is an integration of the other factors into a specific willingness to act at a certain point in time that can only be referred to rather generally as a motivation when asked about at other points in time. It seems likely that the participants refer to intentions rather diffusely as that they want to achieve something and then quickly turn their argumentation towards the reasons for having this wish to perform a certain action. This does not mean that intentions are obsolete in the model; it means that people focus on the determinants of an intention rather than the intention in itself, which represents the integration of all aspects. The attitude concept used by the participants is fuzzy and does also include value orientations. The most relevant values mentioned are environmental, global justice and intergenerational justice. A better differentiation between attitudes and values seems to be relevant and the inclusion of value orientations or perceived moral obligations might be beneficial for a more comprehensive action model. Models like the value-belief-norm theory (Stern, 2000) or the norm-activation-model (Schwartz and Howard, 1981) could be a starting point as they link value orientations to behaviour. Approaches of integrating the theory of planned behaviour with the aforementioned have been proposed (e.g., Klöckner and Blöbaum, 2010).

Furthermore, energy behaviour is obviously strongly motivated by non-environmental motivations. The motives to reduce behavioural costs (both money and effort) and the motivations to gain comfort, safety and health were seen to be powerful predictors of energy behaviour according to the perception of the participants. This is in line with findings by Mundaca et al. (2010) who identified such aspects as determinants of at least some investment decisions. Although such aspects can be represented as beliefs in an extended theory of planned behaviour, it should be underlined that models that try to relate energy efficiency solely to environmental beliefs miss a number of very relevant alternative aspects. When measuring energy efficiency related beliefs, it is therefore

necessary to have a broad approach that covers also alternative motivations. Social norms are for most participants not visible at the first glance. After some consideration, children, neighbours, colleagues, friends and media are identified as relevant sources of social impact, but the perceived social pressure is generally low. Some participants even describe that they would show reactance if they experienced social pressure. That does not mean that social norms are not a relevant variable in an action model, rather than their influence is not obvious to people at first glance, especially in domains where it is experienced as an intrusion into the private sphere. Interestingly, the participants differentiate between what other people do and what they express as an expectation. A mismatch between the two ways of communicating social norms is experienced as especially demotivating. Self-efficacy is interestingly mostly determined by the perception of consumer efficacy (Ellen et al., 1991). People who perceive some relevance of their individual contribution do act, others do not. The potential irrelevance of the contribution is discussed on at least three levels:

a my personal contribution is just a drop in the ocean

b so few people live in Northern Norway that it does not matter

c four million Norwegians do not matter in the global context.

Minor impacts on self-efficacy were identified when other people lived in the household that could interfere with one's behaviour and weather variations that could not be controlled. The aspect of expected efficacy of the behaviour (not so much if a person is able to perform it) is an extension of the model in Figure 1 that should be considered. Awareness of the energy topic was usually triggered by either electricity prices or impressive weather events that were cognitively connected to climate change. The misunderstanding of weather phenomena for climate change is a common finding (e.g., Bostrom et al., 1994). That awareness of a problem is relevant to trigger the process of intention formation is a confirmation of the assumptions of the extended model. Finally, some participants named habits as a relevant impact factor on their behaviour and gave examples that clearly confirmed the theoretical concept of habits as uncontrollable, unconscious and hard to change (Verplanken and Wood, 2006). What is surprising is that they were able to describe the processes even if they are automatic, which means that they are able to reflect on their own automaticity in behaviour. This happens when they for example realise after they performed a behavioural pattern (e.g., setting the water cooker to work automatically before taking a shower) that it did not serve their purpose and that they did that without thinking. It means that habits become accessible for reflection, when the habitualised behaviour fails in achieving a goal. In total, it can be concluded, that the framework model is a viable representation of people's concepts but that it has to be extended by value orientations and alternative motivations and that consumer efficacy is seen as a strong component of self-efficacy.

The perceived barriers could be grouped into five domains: economic barriers, motivational barriers, lack of relevant information, structural barriers and the very weak social barriers. The structural barriers were highly diverse and numerous. Most of them were comparable to determinants identified in the socio-economic approach. Most prominent were structural deficits of alternative transport modes and geographical demands. Family size was perceived as having a strong impact, especially if babies or toddlers or teenagers lived in the household. While the first group increases electricity

use by the perceived need for higher room temperatures and the increased need for washing, the second group is characterised as extremely careless with respect to use of warm water (extensive showering) and electricity for entertainment electronics. This is in line with Brounen et al. (2011). Furthermore, having a teenager in the household is often connected to much extra mobility for driving to activities. The most important building related structural factors were its size, insulation standard and the related age of the building, the type of dwelling (house vs. apartment) and – if it was an apartment – where in the apartment building it was located. Furthermore, ownership vs. renting of the dwelling was a decisive factor with respect to investments taken. Again, much overlap with for example Meier and Rehdanz (2010) can be found. The structural barriers seem to be rather specific to a certain behaviour and need to be mapped out specifically for it. Relevant motivational barriers were low perceived efficacy, anticipated effort and loss of comfort or time, and bad examples showing that the effort put into behaviour did not pay off. Most of the motivational barriers are already reflected as variables within the decision making process described in the framework model. The most relevant economic barriers are a lack of investment money, unconvincing payoff schemes, and too large price differences between the wanted and unwanted alternative. If energy use is not individually accounted for, then this is a major barrier against saving efforts. Finally, a lack of information that is tailored to the needs, easily available, trustworthy, without uncertainties and especially giving feedback about the effects of the individual contribution is another perceived barrier. It is not general information that is lacking but concrete procedural or practical knowledge.

Interestingly, structural facilitators are hardly named. Structural facilitation often seems to be the absence of structural barriers. Even the structural facilitators that were named are actually barriers against the unwanted behaviour. The most discussed facilitators are economic: incentives, subsidy, investment money availability, economic punishment on unwanted behaviours and high energy prices which would again fit well with the socio-economic approach. Interestingly, a relevant minority of participants opposed this dominance of economy by claiming that for them economy is not as relevant as their value orientations. These values are actually a part of the motivational facilitators. Gaining comfort, time, health, safety or good quality products are motivations that have the positive environmental impact as a welcomed side effect. On the facilitation side, information is also discussed. Information that is tailored to the specific needs in a situation, that is easily accessible, trustworthy, provides feedback in comparison with relevant others in the same living situation (Schultz et al., 2007) and is communicated in an engaging but neutral way is perceived as a facilitator. Facilitation through social channels is mainly a matter of legislative measures. The support for such measures is surprisingly high, but a relevant minority reacts strongly to them. Furthermore, the importance of models (either individuals or authorities that take the lead) is acknowledged. One's own children are perceived as a particularly powerful source of influence and the motivating function of competition is named by some.

Although it was not a core topic of the discussions some indications could be found that diffusion of energy innovations also follows the patterns described by Rogers (2003). It became obvious that many participants acclaimed the role of early adopters in driving the adoption process of energy innovation without wanting to be innovators themselves. These early adopters could in the energy context also be authorities.

As a general conclusion, it can be said, that energy behaviour in households seems to be determined by variables that can be located both on the psychological and the

socio-economical side. Integrating them into one framework model is demanding and the described findings of this qualitative study are just a starting point.

5.2 Weaknesses of the study

This study was based on a sample of 70 Norwegians which was composed to represent a large variety of living conditions in Norway. It was not a representative sample of the Norwegian population. Due to logistical problems of recruiting people in the most rural parts of Norway insights of people living far off the big cities or much inland are not included in the study. This is a limitation for the generalisability of the results.

The recruitment of participants via newspaper adverts and the compensation with a rather substantial amount of money might have affected the selection of people attending. It is for example possible that especially people with strong economic motivation responded to the recruitment and the influence of economy on energy decisions is therefore overrated. It is interesting, however, that a relatively large number of environmentally motivated people participated. The topic itself might also have motivated some to participate. It is therefore most likely that the sample lacks the people that are neither interested in energy use nor motivated by money.

5.3 Conclusions

The study has a number of relevant implications for practitioners and policy makers. In their collective analyses the focus groups identify a variety of barriers but also potential facilitators for a more energy efficient behaviour in their households. Most strikingly – and in accordance with more differentiated psychological approaches to behavioural change – the participants of the focus groups point to restrictions of their behaviours that cannot be targeted solely with the common strategies to promote energy efficiency like economic incentives or information campaigns. Based on the participants perception of barriers we would like to recommend more refined communication measures like feedback, improvement of consumer efficacy, activation of social norms, and alternative motivations for energy efficiency. Many participants were clear about that it is difficult to be motivated to perform an action where the result is unsure. They demanded a feedback about the real effect of their efforts. Giving this information is crucial in any kind of campaign: if people are about to be motivated to energy efficiency they need to be told what their actions can and eventually have achieved in terms of reduced environmental impact. This has a very close link to perceived consumer efficacy as it will strengthen perceived efficacy if the real improvement is presented in a comprehensible way. In terms of social norms it is obvious that descriptive norms are most influential, especially for government actors. To appear inconsistent between what is preached and what is done is demotivating the public to participate. Setting good examples is more important than long speeches and appeals. On the other hand do bad examples – even if only remotely related – have a devastating effect on motivation. Mistrust to an actor in one domain spreads to his/her trustworthiness in other domains. If information is given to people it needs to be tailored to their needs, because too broad information is not perceived as helpful in solving a concrete problem. This means that communication systems which can adapt the information presented dynamically to the needs of the information seeker can be of great value. Finally, the importance alternative motives could have to promote a

certain behaviour should not be underestimated. Many of the participants stated that a perceived gain of health or safety could motivate them to do something that also has a positive environmental impact.

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Notes

1 In the original theory this construct is named 'perceived behavioural control'; often self-efficacy is treated as a sub-dimension of perceived behavioural control (Ajzen, 2002); the other sub-dimension is 'controllability'. However, in this model 'self-efficacy' is meant in a broad sense that is equivalent with perceived behavioural control.