



Project note no. 19-2012

Nina Heidenstrøm og Pål Strandbakken

Air to air heat pumps in Norwegian households

**Technological and market development, media
analysis, and the use of practice theory to
study consumption**

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Project note no. 19 – 2012

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Tittel Luft til luft varmepumper i norske hus- holdninger	Antall sider 59	Dato 20.12.2012
Title Air to air heat pumps in Norwegian households	ISBN	ISSN
Forfatter(e) Nina Heidenstrøm og Pål Strandbakken	Prosjektnummer 11201116	Faglig ansvarlig sign. 
Oppdragsgiver Norges Forskningsråd		
Sammendrag I det følgende notatet svarer vi på noen innledende spørsmål om teknologi, markedsføring og utbredelse av varmepumper, og gir en grundig redegjørelse av praksisteori som det grunnleggende teoretiske rammeverket i dette prosjektet.		
Summary In the following paper we answer some initial questions about technology, marketing and the distribution of heat pumps, and provide a thorough account of practice theory as the basic theoretical framework of this project.		
Stikkord Varmepumper, energiforbruk, praksisteori		
Keywords Heat pumps, energy consumption, practice theory		

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practice theory to study consumption

by

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2012

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Forord

Dette prosjektnotatet er resultatet av den første arbeidspakken i prosjektet “Energy saving technologies in households: the heat pump”. Prosjektet er en del av Forskningsrådets Renergi-program og varer fra 2012-2014. I tillegg til forfatterne av rapporten, har Harald Throne-Holst jobbet på prosjektet og bidratt med innspill til teksten.

Arbeidspakke 1 «Desktop Research/State of the Art» er hovedsakelig delt i to. I den første delen har målet vært å få en oversikt over tilgjengelig data om varmepumper i Norge som salgstall, mediedekning, teknologiutvikling og subsidiering. Denne utredningen finnes i kapittel 1-4.

I den andre delen har vi fokusert på prosjektets teoretiske rammeverk, praksisteori, gjennom kollokvier på SIFO høsten 2012. Resultatet av dette finnes i kapittel 6. I tillegg til forfatterne har Harald Throne-Holst, Gunnar Vittersø, Silje Skuland og Anita Borch deltatt på kollokvier og bidratt til diskusjonen om bruk av praksisteori i forbruksforskningen.

Prosjektets partner, Statens Byggeforskningsinstitutt (SBI), har bidratt med en gjennomgang av deres avsluttede prosjekt om varmepumper og komfortpraksiser. Dette finnes i kapittel 5, og er skrevet av Toke Haunstrup Christensen og Kirsten Gram-Hanssen.

Vedlagt denne rapporten følger også en gjennomgang av metodiske spørsmål, samt en intervjuguide som er starten på arbeidspakke 2 i prosjektet.

Prosjektnotatet vil fungere som et bakgrunnsdokument i det videre prosjektarbeidet.

Oslo, 20. desember 2012

Innhold

Forord.....	5
Innhold	7
Sammendrag.....	9
Summary	11
1 Introduction.....	13
2 Heat Pump Technology	15
2.1 The basic functionality of a heat pump	15
2.2 Air to air heat pumps.....	16
3 Economic and environmental aspects.....	19
3.1 Reduced energy consumption?.....	19
3.2 Energy labelling	21
3.3 Indoor climate	21
3.4 Possible rebound effects.....	22
4 Market development of air to air heat pumps	23
4.1 Heat pump history	23
4.2 Heat pump aesthetics.....	25
4.3 A qualitative media analysis	26
5 Danish study on air-to-air heat pumps, comfort practices and electricity consumption ..	29
5.1 Background	29
5.2 Methods.....	30
5.3 Main findings for dwellings	30
5.3.1 Survey and metering data.....	30
5.3.2 Qualitative interviews	31
5.4 Main findings for summerhouses – a brief summary.....	33
6 Theories of practice	35
6.1 Practice theory and consumer research	35
6.2 Empirical examples of the practice theory approach in modern consumer studies	40
6.2.1 Kirsten Gram-Hansen: Understanding change and continuity in residential	40
energy consumption.....	40
6.2.2 Monica Truninger: Cooking with Bimby in a moment of requirement: Exploring	41
conventions and practice perspectives	41
6.2.3 Turo-Kimmo Lehtonen: The domestication of new technologies as a set of trials	42
6.2.4 Elizabeth Shove & Mika Pantzar: Consumers, Producers and Practices:	44
Understanding the invention and reinvention of Nordic walking	44
6.2.5 Oksanen-Särelä, K., and Timonen, P: Diversification of practice – the case of	45
Nordic walking	45
6.2.6 Paolo Magaudda: When materiality ‘bites back’: Digital music consumption	46
practices in the age of dematerialization.....	46
6.3 Ann Swidler: What anchors cultural practices	47
References.....	49
Appendix.....	53

Sammendrag

I dette prosjektet studerer vi hvordan bruken av luft til luft varmepumper påvirker energiforbruket i Norge, sammenlignet med Danmark. I det følgende notatet svarer vi på noen innledende spørsmål om teknologi, markedsføring og utbredelse av varmepumper, og gir en grundig redegjørelse av praksisteori som det grunnleggende teoretiske rammeverket i dette prosjektet.

En luft til luft varmepumpe brukes for å flytte varm luft fra ett punkt til et annet. Den bruker lite energi, og kan dermed produsere varme svært energieffektivt. I Norge ble det i 2009 solgt litt over 80 000 varmepumper, flesteparten av disse er luft til luft. Etter at Enova SF begynte å subsidiere luft til luft varmepumper i 2003, har det skjedd en dramatisk økning i antall solgte enheter per år, selv etter at subsidieringen ble fjernet i 2006.

Vi antar at en av hovedårsakene til at norske husholdninger velger å kjøpe en luft til luft varmepumpe er å spare penger. Norske strømpriser har økt betydelig siden 2000, og en luft til luft varmepumpe er en relativt beskjeden investering som potensielt kan spare opp mot 3000kWh per år, med et forbruk på 8000kWh til oppvarming. Likevel ser man at den reelle innsparingen ikke er så stor som den teoretiske. Det finnes flere såkalte rebound-effekter; økning i innendørs komfort, bruk av varmepumpe til kjøling om sommeren, eller feilaktig bruk av varmepumpen. Disse effektene vil vi studere videre i prosjektet.

I det allerede gjennomførte danske prosjektet «Varmepumper og elforbruk – betydningen av ændrede komforttemperaturer», finner Statens Byggeforskningsinstitut at de fleste kjøper varmepumpe for å spare penger og energi, mens omtrent en tredjedel svarer at de kjøper varmepumpe for å øke innendørskomforten. 30 % øker innetemperaturen etter at de har installert varmepumpe. En analyse av måledata viser at en femtedel av den potensielle energisparingen oppnås ikke i praksis på grunn av endringer i oppvarmings- og komfortpraksiser.

Gjennom å bruke praksisteori kan vi videre studere disse endringene i oppvarming og komfort. I dette prosjektet bruker vi i hovedsak praksisteori der forbruksforskning står i fokus, primært studier gjort etter 2005. En praksis kan defineres som en rutinisert type handling bestående av flere elementer som er knyttet sammen. Disse elementene er kroppsliggjorte vaner og kunnskap, institusjonell kunnskap og regler, personlige engasjementer og teknologier. Ved å studere varmepumper med utgangspunkt i praksis kan vi se hvordan disse elementene interagerer, for eksempel hvordan husholdningers oppvarmingsvaner kan endres når man introduserer en ny teknologi.

Summary

In this project, we study how the use of air to air heat pumps influence energy consumption in Norway compared to Denmark. In the following paper we answer some initial questions about technology, marketing and distribution of heat pumps, and provide a thorough account of practice theory as the basic theoretical framework of this project.

An air to air heat pump is used to move hot air from one point to another. It uses little energy, and can thus produce heat in an energy efficient manner. In 2009, a approx. 80 000 heat pumps were sold in Norway, most of which were air to air. After Enova SF began to subsidize air to air heat pumps in 2003, there has been a dramatic increase in the number of units sold per year, even after the subsidies were removed in 2006.

We assume that one of the main reasons that Norwegian households choose to purchase an air to air heat pump is in order to save money. Norwegian electricity prices have increased significantly since 2000 and an air to air heat pump is a relatively small investment that could potentially save up to 3000kWh per year, with a consumption of 8000kWh for heating. Yet we see that the real savings are not as large as the theoretical. There are several so-called rebound effects such as increased indoor comfort, use of heat pumps for cooling in the summer, or improper use of the heat pump. These effects we will be studied further in this project.

In the completed Danish project "Varmepumper og elforbrug – betydningen av ændrede komforttemperaturer," the Danish Building Research Institute finds that most people buy a heat pump to save money and energy, while about a third said they buy heat pump to increase indoor comfort. 30% increase their indoor temperature after installing the heat pump. An analysis of data show that one-fifth of the potential energy saving is not achieved in practice due to changes in heating and comfort practices.

By using practice theory, we can further study these changes in heating and comfort. In this project we mainly use practice theory as it is used in consumer studies and primarily studies after 2005. A practice can be defined as a routinization type of action consisting of several elements that are linked together. These elements are embodied habits and knowledge, institutional knowledge and rules, personal engagements and technologies. By studying heat pumps on the basis of practice, we can see how these elements interact, such as how household heating habits can change when introducing a new technology.

1 Introduction

This project report is the first publication of the project “Energy saving technologies in households: the heat pump”. It is based on the first work package “Desktop research/State of the art”, running from 15.August – 15.December 2012. The project is financed by the Norwegian Research Council through the RENERGI-program and will be completed in December 2014. SIFO is the coordinator of the project, and The Danish Building Research Institute (SBI) in Denmark is our project partner.

The report consists of three main parts. The first is an overview of heat pump technologies that covers functionality, and economic and environmental savings. The second part is a review of the market development of the air to air heat pump, including aesthetic aspects, and a media analysis of newspaper articles and general media attention over the last 10 years. The third and final part is a literature review of the project’s main theoretical foundation, namely practice theory. In the concluding chapter we discuss further research on the basis of this report. In addition, we have tried to gather some of the existing research on heat pump practices in this report, mainly from Denmark, and give an overview of other relevant empirical data from SIFO.

Our main research question in this project is: *how do heat pumps influence energy use in households in Norway and Denmark?*, followed by the *why do instalments yield these results?* In addition, we have a number of more specific inquiries such as the discrepancy between theoretical and actual savings, how households interact with this technology, and how key stakeholders has marketed air to air heat pumps over the past decade. The project is limited to air to air heat pumps only, thus not including other pumps or forms of energy saving household technologies.

As we have not gathered any empirical data in this project yet, the report will be based on existing data from SIFO-projects (mainly “A secret success”), and secondary data from Statistics Norway, NVE, Enova SF, SBI, and NOVAP.

The main purpose of this project report is to establish a background document that contains the main aspects of the development of a new heating technology in Norwegian households, and to explore the possibilities of using practice theory in order to analyse consumer behaviour in relation to this development. It is also a learning process for SIFO in particular, making us equipped to ask the right questions and have the most productive focus throughout the project. The report also contains an appendix covering some of the methodological aspects discussed prior to the data collection that will take place in 2013.

2 Heat Pump Technology

2.1 The basic functionality of a heat pump

Heat flows naturally from a hot place to a cold place. The basic task of the heat pumps is to move this heat in the opposite direction, from a cooler to a hotter place. In order to do so, it requires the use of a relatively small amount of high quality energy. The role of the heat pump is to collect the energy for example from the ground, the air, or the water, and release it into a dwelling (SEAI 2012). Heat pumps can also be used for cooling, and heat is then transferred in the opposite direction.

The heat pump needs external energy in order to transport the heat from its source. The basic equation is explained by the Heat Pump Centre (2012a): “Theoretically, the total heat delivered by the heat pump is equal to the heat extracted from the heat source, plus the amount of drive energy supplied. Electrically-driven heat pumps for heating buildings typically supply 100 kWh of heat with just 20-40 kWh of electricity. Many industrial heat pumps can achieve even higher performance, and supply the same amount of heat with only 3-10 kWh of electricity”.

The elementary principle of a heat pump, i.e. to move heat in the opposite direction of what is natural, is a technological invention made 150 years ago by Lord Kelvin. The technology was, however, not modified until the 1940s by Robert Webber. The first heat pump was installed in Norway in the 1970s (Norsk Bioenergiforening et al. 2011). It is based on the relationship between temperature and the pressure in a gas or liquid that circulates internally in the pump, which means that the pressure changes. Increasing the pressure increases the boiling point of the liquid. The technology, then, can move heat from a lower to a higher temperature level (SINTEF 2006, NOVAP 2010).

Almost all heat pumps work on the principle of the “vapour compression cycle”. The pump has the following main components: a compressor, an expansion valve, and two heat exchangers (an evaporator and a condenser). There are several different variations of these components on the market, and there is a continuous development of new and more efficient components. The compressor is usually driven by an electric motor.

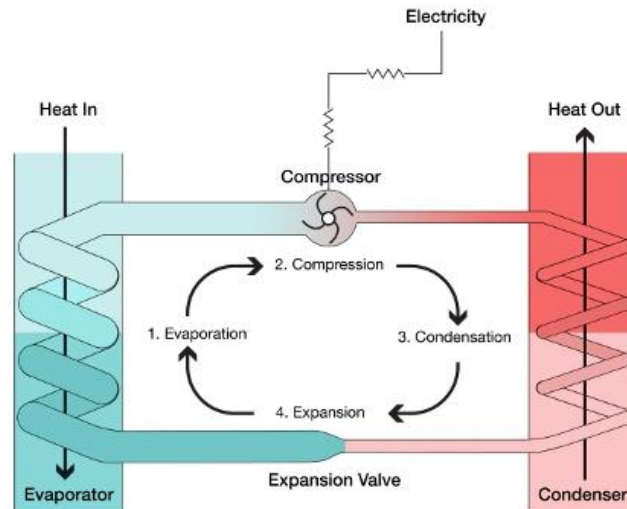


Figure 2-1: Basic functions of a heat pump. Source: Local Government Association, UK.

All the components of the heat pump, as shown in figure 1, are elements of a closed circuit. When the pump is used for heating, the outdoor coil is an evaporator and the indoor coil is a condenser. A volatile liquid, known as the working fluid or refrigerant, circulates through the four components (Heat pump Centre 2012a).¹ In the evaporator, the refrigerant is kept at a lower temperature than the heat source, so that this heat flows from the heat source and to the liquid. This liquid then evaporates. The vapour from the evaporator is compressed to a higher pressure and temperature, which enables it to carry the thermal energy from the outside heat source. The hot vapour then goes into the condenser and out to the indoor air, distributed inside the building. The refrigerant goes into the expansion valve, where it returns to its original state (expanded and cooled down) and goes into the evaporator again (SEAI 2012).

2.2 Air to air heat pumps

Heat pumps that use the outside air as their heat source is the most common type. In the Norwegian market, it accounts for over 95 % of all units sold (see chapter 4). Because the pump uses the ambient air, it can be vulnerable to seasonal changes in temperature and climate. The colder the air outside, the harder the heat pump needs to work in order to raise the temperature to what is required to heat an indoor space. According to the Heat Pump Centre (2012b), an air to air heat pump achieves 10-30 % lower seasonal performance than the water based heat pumps. With the rather cold climate in Norway, air to air heat pumps have faced some difficulties when the temperatures fall below -15-20 °C. The newest technologies can, however, deal with temperatures as low as -25 °C. It is recommended that households supplement with radiators, wood burning etc. when the temperature gets below -15 °C (Varmepumpeinfo 2009).

¹ There are different refrigerants that have been used in heat pumps. CFC gasses are now forbidden in all heat pumps. HCFC are forbidden in new construction because of its impact on ozone depletion and greenhouse gasses. The most common refrigerant in heat pumps today is R-410A is a [zeotropic](#), near-[azeotropic](#) mixture of [difluoromethane](#) (CH₂F₂, called R-32) and [pentafluoroethane](#) (CHF₂CF₃, called R-125). It does not contribute to ozone depletion, but it has a high global warming potential.

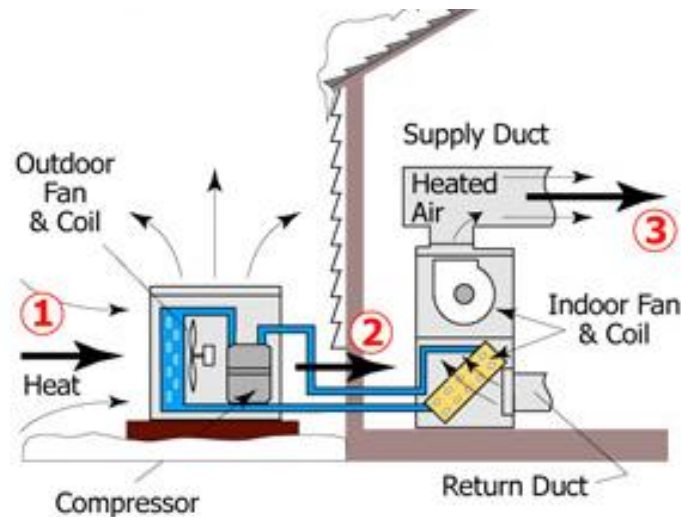


Figure 2-2: Air to air heat pump. Source: Sprinter Heating

As figure 2 shows, the air to air heat pump consists of two main units, one on the outside and one on the inside of the building. These need to be placed close to each other; most pumps have a maximum distance of 20 meters. The placement of the indoor part is crucial to achieve the best heat distribution. With an air to air heat pump households can gain 2-3 times as much heat as the power added, but the effect will decrease with lower temperatures.

There is a range of models to choose from in the Norwegian market today, and it is not always easy to find the most suitable heat pump. Proper sizing, design, instalment, and operation of the heat pump is crucial in order to achieve maximum energy saving. It is also dependent on geographical location (due to temperatures and other weather conditions such as humidity), the households heating needs, and the standard of the dwelling (isolation, materials, layout etc.).

The efficiency of the air to air heat pump is measured using COP (Coefficient of Performance), or “heat factor”. COP is how much heat the pump is able to produce for each watt it uses. If the pump using 1 watt can produce 2, 5 watt, the COP is 2, 5. The higher COP the better. For comparison, an electric oven need 1kW to produce 1kW. The problem with air to air heat pumps is that the pump produces different COP depending on humidity and temperature. This means that it is not enough to test the heat pump at one single temperature (Forbrukerrådet 2012).

The Swedish Energy Agency has tested a significant amount of air to air heat pumps available in the market today, using another criterion, namely the “yearly COP”. This shows what COP the pump is able to produce throughout the year. Another important factor in measuring the effectiveness of the air to air heat pump is the “heat effect”. The heat pump needs to be powerful enough to produce sufficient heat for a specific dwelling. This effect is measured with an indoor temperature of +20 °C, four different outdoor temperatures from +7 to -15°C, and different humidity (Energimyndigheten 2009).

The following list contains some of the advantages and disadvantages of the air to air heat pump²:

² The list is mainly based on information from NOVAP, but supplemented with other relevant aspects.

Advantages

- The heat pump contains filters that clean the air of dust and other particles. This will provide a better indoor climate than with wood burning or radiators.
- The investment costs are quite low, and the installation is rather straight forward.
- The pump has low maintenance and is easy to use
- It requires a limited amount of space both inside and outside the dwelling.
- The heat source – outside air – is available everywhere.
- If a heat pump replaces oil burning, it will reduce greenhouse gas emissions substantially.

Disadvantages

- The pump is not able to provide enough heat in the coldest periods.
- With temperatures below 2-5 °C you will need defrosting which will reduce the effect of the heat pump by 10-20 %.
- Moist and saline air can shorten the lifespan of the outdoor unit.
- They may cause some noise both outside and inside.
- The air filter of the indoor unit must be vacuumed and/or replaced regularly to maintain the performance.
- The refrigerant could potentially be a greenhouse gas.
- The lifetime of the air to air heat pump is only 10-15 years.

The air to air heat pump is suitable for households who have a total energy consumption of over 15 000 kWh per year (the average energy consumption for flats is 10 000 kWh, making them less suitable for heat pumps). In addition, the heat pump is most effective in areas with long and relatively mild winters. The floor plan of the building should be open, so that the heat can flow freely (Enova SF 2012).

3 Economic and environmental aspects

When a household decides to buy an air to air heat pump it is very likely that *economy* is a key factor. Electricity prices in Norway have increased over the past 10-15 years, and the heat pump has become one of the most popular solutions to save electricity (see chapter 4). Besides potentially reduce households' electricity bill, it has some other environmental advantages such as a better indoor climate and a reduction in greenhouse gas emissions. However, the potential to save electricity is overall the main advantage of the heat pump.

3.1 Reduced energy consumption?

One of the elements SIFO intends to investigate in this project is the difference between theoretical and actual savings of electricity. Are there aspects of households' practices that may be preventing maximum energy saving? How do households actually relate to their own energy consumption, and to the heat pump itself? And have installers done a good enough job?

These are highly relevant questions for the project, but in this report, we mainly concentrate on the theoretical savings, as we do not have any empirical data on household practices yet.

The initial cost of an air to air heat pump is between 15 000 – 30 000 NOK including installation (NOVAP 2009). The total cost is dependent on the type of pump, whether it replaces the oil burning stove, and the size of the dwelling. The investment in an air to air heat pump will theoretically be profitable after 3-6 years, and the pump has a lifespan of approx. 10-15 years. Models with temperature control and a timer provides lower energy consumption than pumps without (Enova SF 2012). Several electricity suppliers offer households to finance their heat pump through the electricity bill. This means that you will continue to pay a higher electricity bill, but it includes a down payment on the heat pump³.

³ See for example Hafslund's financing plan for heat pumps:
http://hafslund.no/privat/artikler/les_artikkel.asp?artikkelid=2341

Table 3-1: Theoretical savings of air to air heat pumps in Norwegian households

Total energy requirement	Percentage for heating (55 %)	Energy saving*	Possible saving**
[kWh/year]	[kWh/year]	[kWh/year]	[NOK/year]
15.000 kWh	8.250 kWh	2.900 kWh	2.900
20.000 kWh	11.000 kWh	3.900 kWh	3.900
25.000 kWh	13.750 kWh	4.800 kWh	4.800
30.000 kWh	16.500 kWh	5.800 kWh	5.800
35.000 kWh	19.250 kWh	6.700 kWh	6.700
40.000 kWh	22.000 kWh	7.700 kWh	7.700

*The air to air heat pump covers 60% of the total heating requirement (if the dwelling has an open-plan living). It is used an average annual efficiency of the pump of 2.4. This indicates how much more heat is emitted in relation to the electricity supplied to the pump. The higher this number is the better.

** An electricity price of 1 NOK / kWh.

Source: Enova SF 2012

In the report “Evaluering av tilskuddsordningen til varmepumper, pelletskaminer og styrings-systemer”, it is argued that it is difficult for households that use less than 8000kWh per year for heating to gain any profit from investing in a heat pump. When the electricity consumption exceeds 13000kWh for heating, the heat pump is highly efficient and profitable. The industry operates with a 40-60 % savings of the households energy expenses with an air to air heat pump. The water based heat pumps can cover as much as 75-90 % of the energy requirement for heating (Bjørnstad et al. 2005:145).

There can, as the last section explained, be some difficulties with testing the efficiency of air to air heat pumps. They are most commonly tested in order to find the theoretical maximal effect, often calculated with an outdoor temperature of 7 degrees. The effect will decline when the temperature drops. Retailers using these results are not presenting an accurate image of how much money a household have the potential to save.

In Statistics Norway’s survey on household energy consumption in 2009, 11 % answered that they had increased their energy consumption after buying a heat pump (their own subjective assessment). A further 22 % answered that their energy consumption had not changed, and 58 % answered that they had reduced their consumption (Statistics Norway 2011). Statistics Norway argues that installing a heat pump will change household behaviour. They find that 25 % increased the indoor temperature, while 33 % used more rooms than before installing a heat pump. 17 % use the device for cooling during the summer months. Changes in behaviour, or practice, will be the main area studied in this project.

In 2010, TNS Gallup conducted a representative national websurvey on behalf of SIFO. The survey included questions on household energy saving and use. In this survey, we asked whether the heat pump had contributed to reducing their electricity consumption. Table 3-2 show the results:

Table 3-2: Has the heat pump contributed to reducing the household’s electricity consumption? (Per cent)

1 (Very little)	11,5
2	11,5
3	25
4	23,5
5 (Largely)	16
Do not know	12

The results indicate that respondents have experienced some reduction in electricity consumption, but clearly not always to a high degree. We also asked whether households used the heat pump as air condition in the summer, and find, like Statistics Norway, that 17 % do.

So, do households *actually* save any money when they buy a heat pump? Statistics Norway has also calculated the electricity consumption for households with and without a heat pump⁴. It shows that households with a heat pump use slightly less electricity than households without. For dwellings between 100-149 m², the difference was approx. 2000kWh per year in 2004 and 2006, but in 2009, there was no difference. For dwellings over 149 m², households with a heat pump did not use any less electricity in 2006 and 2009, only in 2004. It is worth noting that households with a heat pump used less heating oil and less wood than households without a pump, which is a step in the right direction, environmentally.

3.2 Energy labelling

From 1 July 2010, all residential and commercial buildings (over 50m²) sold or rented out are required to have an energy certificate. The certificate consists of an energy label that shows the total energy standard of the building. The label contains an energy rating (A-G) and a heat rating (from red to green). It is possible for households to rate their dwelling online, by providing information on building type, year of construction, floor space and means of heating (Energimerking 2010). By installing a heat pump, the dwelling's energy label can be improved significantly, leading to an increased market value.

According to EU regulations (Energy labelling directive 2010/30/EU) all heat pumps that are sold through Norwegian retailers need to have an energy label on display in the shop, like all energy consuming appliances. Traditionally, the energy label has a scale from A-G, but because almost all heat pumps (that have an effect up to 12 kW, which are the most commonly used in households) fulfil the A standard, A+-A+++ has also been used here⁵. The refined scale is meant to make it easier for consumers to choose the most energy efficient heat pump (NOVAP 2012). Whether energy labels helps consumers to make the right choice or if scale appears confusing is debatable.



3.3 Indoor climate

Other than saving energy, the heat pump has the potential to reduce symptoms of allergy. The filter in some of the newer heat pumps can capture up to 99% of the particles in the outside air.

NAAF (The Norwegian Asthma and Allergy Association) primarily recommends water based heat pumps for the best possible indoor air quality, since as it avoids increased air circulation, causing dust and other particles to swirl. However, air to air heat pumps with sufficient filters (like carbon based filters) that have a documented effect on reducing pollen, and are maintained regularly can be a good solution.

A good indoor climate with an air to air heat pump can be achieved with:

- Choosing a heat pump with a (documented) good filter. NAAF has approved some heat pump filters.

⁴ <http://www.ssb.no/emner/01/03/10/husenergi/tab-2011-04-19-10.html>

⁵ The picture is from the Norwegian energy certificate by NVE

- Service every second year.
- Frequent dusting to avoid it from swirling.
- Make sure that the heat pump is correctly installed.
- Clean filters and maintain the heat pump regularly.

With regards to the general comfort level, Norwegian heat pump owners seem to be satisfied. Bjørnstad et al. (2005) finds that owners generally are not concerned with dust or dry air. Households have experienced some difficulties with noise from either the indoor or outdoor unit. The authors also find that over 90 % experiences a certain or significant improvement of comfort and indoor climate.

3.4 Possible rebound effects

A significant aspect of this project is to investigate the possible rebound effects of air to air heat pumps in Norwegian households. The rebound effect explains the gap between the potential and the actual energy saving from various measures (Throne-Holst et al. 2007). Herring (2008) defines the rebound effect in the following way:

In energy studies, the rebound effect is used to describe the effect that the lower costs of energy services, due to increased energy efficiency, has on consumer behaviour both individually and nationally. Put simply, the 'rebound' effect is the extent of the energy saving produced by an efficiency investment that is taken back by consumers in the form of higher consumption, either in the form of more hours of use or a higher quality of energy service.

There are several potential rebound effects in the use of air to air heat pumps. The first and perhaps most prominent is the increase of indoor comfort. This can be achieved through increased indoor temperature, heating more rooms than before installing a heat pump, or using other forms of heating such as wood burning and panel ovens more in addition to the heat pump.

Using the heat pump for air conditioning in the summer months is another form of rebound effect. As previously mentioned both SIFO and Statistics Norway found that 17 % of heat pump users (any type) also reverse the effect and use it for cooling in the summer. However, the increased energy use may not be significant in Norway because we have very few hot summer days, and very few hours with high temperatures during those few days. As chapter 5 will show, the experience from the Danish project on heat pumps is that air condition is used to prolong the summer season, especially in summer houses.

A third form of rebound effect may come from incorrect use of the device. It is required that installers give households a thorough review of the heat pump in order to ensure the most energy efficient use. By missing out on such a review households may make mistakes that are relatively small, but can increase their energy use. This may for instance be: insufficient knowledge of the remote control, buttons on the device etc. or how to use the heat pump along with other heating sources.

During the project period we intend to investigate the above rebound effects, but also to look for other potentially inefficient practices.

4 Market development of air to air heat pumps

4.1 Heat pump history

The modern air to air heat pumps were introduced to the Norwegian market around 2000, after over 35 years of working to find an efficient pump suited for household use. Electricity prices were also very low in this period; therefore the need for an energy saving technology was not extensive.

In the yearly Statistics Norway survey on heating equipment, heat pumps were not included until 2004, when 4 % of the population used an air to air heat pump. 2 % used it as their main heating source. This changed radically when Enova SF started to subsidise the air to air heat pump in 2003. In 2003, Enova SF subsidised 18 154 heat pump investments, which covered one third of the heat pump sale in Norway that year (see Bjørnstad et al. 2005 for a thorough review of the subsidy scheme).

In a survey by SIFO conducted in October 2010⁶, we find that the installation of heat pumps started to increase in 2003; and most households installed one in from 2006-2010. Statistics Norway has data on heat pumps up to 2009, when 18, 5 % of Norwegian households owned a heat pump. SIFO's figures from 2010 show a higher number, as many as 32 % reported that they had installed a heat pump.

The subsidies from Enova SF only lasted from 2003-2006, but it is clear that this has contributed to an explosion in the market for air to air heat pumps, even though the grants were relatively modest (up to 20 % of the total cost, an average of 4200 NOK). However, it got a lot of media attention and has been a successful policy instrument for reducing energy consumption in Norwegian households, and making an energy saving technology visible, available, trendy, and affordable for most people. Enova SF continues to subsidise the more expensive alternatives such as solar collectors, air to water heat pumps, fluid to water heat pumps, and pellets burners. Even though air to air heat pumps are not part of this new subsidy, more and more Norwegian households install one. It may then be argued that the new subsidies still have an effect on the sale of heat pumps in general, even though the air to air unit is not included in the new scheme. A negative consequence of the subsidies might be the fast growing market of low quality heat pumps and instalments.

According to Bjørnstad et al. (2005), these companies went bankrupt rather quickly. According to The Norwegian Heat Pump Association (NOVAP), Enova SF also provided consumers with relevant and reliable information about heat pumps during this initiative. Norwegian consumers have a high degree of trust in the government, and when a governmental organisation supports this technology, it is considered safe to invest in it (Stø & Strandbakken 2005).

In 2002, 19.000 air to air heat pumps were sold in Norway. Today, a number of companies sell this technology in Norway, and in 2010, the number increased to over 85.000 units.

⁶ The survey was conducted by TNS Gallup on behalf of SIFO in the project «A secret Success»

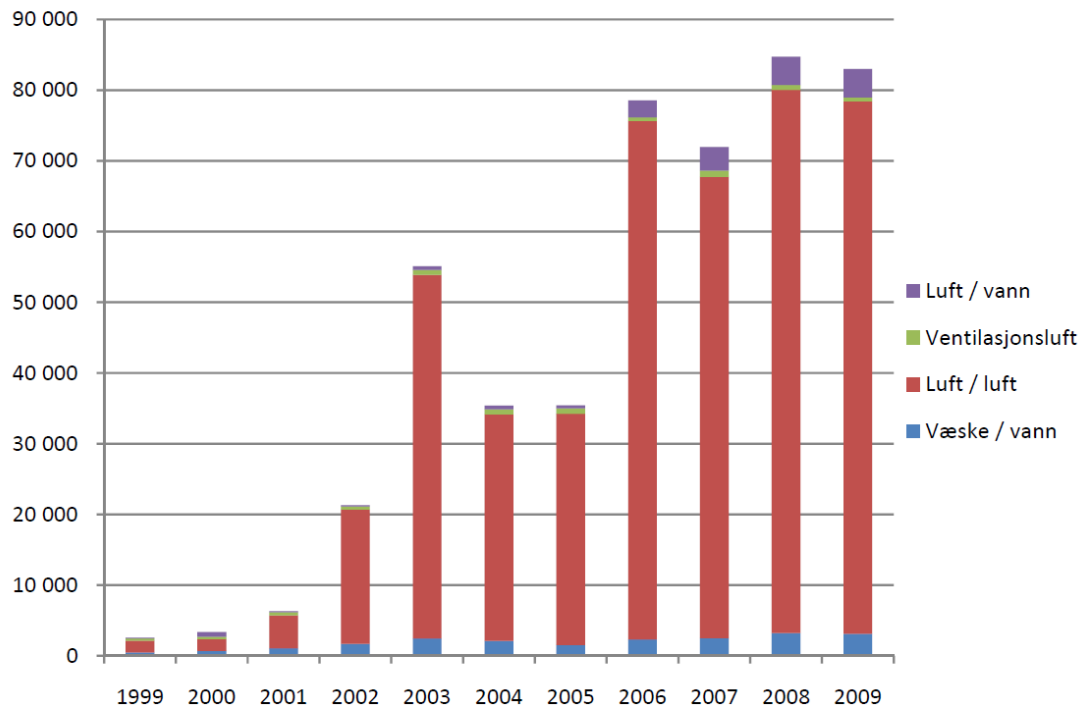


Figure 4-1: Number of heat pump units sold in Norway per year Source: NOVAP in NVE (2011)

Figure 4-1 show that the number of units sold almost tripled in 2003, most likely due to Enova SF's subsidies. It stabilised in 2004 and 2005, but from 2006, it almost doubled again. This is consistent with the survey results from SIFO.

The figure also shows that almost all heat pumps sold in Norway are air to air heat pumps. It is considered to be an affordable investment for most households, unlike the water based pumps that have a substantially higher investment cost. Even though households would have the potential to save more money in the long run with the more expensive pumps, they are not prepared to invest in it. Previous studies (Heidenstrøm et. al 2011, Strandbakken 2006) show that most consumers are only willing to invest in products that will pay off within 3-5 years.

We do not have any overview of the distribution between specific types of heat pumps, but Panasonic, Toshiba and Mitsubishi have a significant market share. The Panasonic HE9LKE model is the top selling in Norway over the past four years.

We assume that many households install an air to air heat pump in order to save money. The increase in electricity prices from 2000, then, is another key element in understanding the development of this product. Norwegian consumers are used to rather low electricity prices compared with the rest of Europe, and we have had long periods with relatively constant prices. However, since 2008 the prices have been about the same level as other European countries.

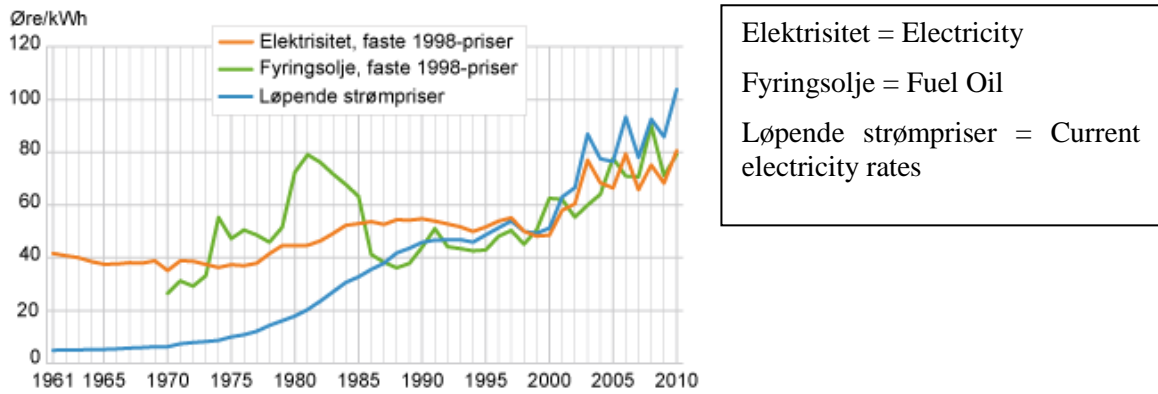


Figure 4-2: Electricity prices for households and farming. Source: Statistics Norway

When a new and relatively complex technology like the heat pump is presented in the market it can take some time before the industry is able to provide all the necessary aspects: training of the sales staff, authorized installers, and information to consumers. There have been some problems with unauthorized installers in the Norwegian market, or that households install the heat pump (incorrectly) themselves. NOVAP offers installers and dealers courses in order to become “NOVAP authorized” which in turn ensures a properly functioning heat pump that is more likely to actually save electricity⁷.

4.2 Heat pump aesthetics

Even though consumers’ primary reason for buying a heat pump is to reduce their electricity bill, the aesthetics of the pump may have made some reluctant. A quick search online, show that many consumers are concerned with the appearance of the air to air heat pump. This can be exemplified through a quote from a crafts forum⁸:

I’m considering a heat pump, but then I would like some advice. I don’t want to have a lump inside my living room, and I would rather not have a lump outside my house either.

The air to air heat pump consists of both an outdoor and indoor unit that needs to be installed in a certain way. The indoor unit should be placed in the biggest and most widely used room, usually in the living room. Depending on the type of unit, it can be positioned high or low on the wall (some models even have a ceiling unit). The outdoor unit should be placed close to the indoor unit, with good drainage and shielded from rain and wind (NOVAP 2011).

For the outdoor unit, it may be a solution to buy a so called “heat pump house”⁹. This is a wooden box with sufficient ventilation that can be placed on top of the unit in order to integrate it better with the house. The box can be painted in the same colour as the house. In addition to improving the aesthetics of the heat pump, the house contributes to reducing icing and snow on the outdoor unit, and prevents leaves and dirt from getting into the pump. The house cost approx. 1500 NOK.



The indoor unit might be a bigger challenge, but over the past few years, some changes in the design of air to air heat pumps have occurred. The most prominent example of this is LG’s

⁷ From 1.september 2013, all installers must be F-gas certified through a course.

⁸ <http://handtverker-tips.origo.no>

⁹ The picture is from www.miba.no

“Art Cool” series, and particularly the Gallery model that entered the market six years ago. Like the advertisement on the right claims, it is “a heat pump designed as a piece of art”.

Today, several manufacturers have a “design model” (Panasonic, Daikin, Toshiba, LG etc.) that is smaller, sleeker and has a more modern appearance than the traditional heat pumps.

Bjørnstad et al. (2005) finds that some households had problems with the aesthetic placement of the heat pump. Almost 25 % of the respondents agreed that this was a problem.

varmepumpe
designet som
et kunstverk...

Et godt bilde er et uttrykk på kvalitet som
gjelder design og funksjonalitet.
Varmepumpen er designet som en bilde ramme, men har
en annen funksjon.

LG ArtCool Gallery er en del av en varmepumpefamilie
som gir deg komfort i hele huset. Mulighetene er uendelige
og du kan velge mellom flere designalternativer.
Et uttrykk som skiller seg ut fra alle andre varmepumper.
Hvis du vil vite mer om denne serien, kontakt oss på telefon eller
gjennom vår nettside.

LG ArtCool Gallery
LG ArtCool og ArtCool Gallery serier er markeds ledende
varmepumper som har svært fine designalternativer.
Et uttrykk som skiller seg ut fra alle andre varmepumper.
Hvis du vil vite mer om denne serien, kontakt oss på telefon eller
gjennom vår nettside.

fra 19 900,-
*inkl. montering

if, NCC, BauerEnergy, LG ArtCool Gallery, LG's Good

4.3 A qualitative media analysis

In this section we have gathered some examples of newspaper articles and advertisements regarding air to air heat pumps in Norway over the past years. It is not a complete overview of the field, and can therefore not be generalised. However, it gives an indication of how the technology is presented for most consumers. It can help answer some of the project’s main research questions: how is this technology actually used in the household? How do advertisements and newspaper articles affect consumer practices? The stakeholder interviews will in addition to this review, give an indication of how an air to air heat pump is presented in the market.

The tables below show a brief overview of some of the newspaper articles and advertisements in Norway (2011-2012) that are relevant for households.

Table 4-1: Newspaper articles

Headline	Text excerpt/summary
Reduced allergies with a heat pump	A fifteen year old girl was given an air to air heat pump from Bauer Energi with a new and improved filter that reduced her allergies.
The big heat pump guide	The Norwegian Consumer Council has launched a guide because “heat pumps are complicated products”.
Heat pumps: What do you save?	“The sellers says that heat out is four times electricity in. But an air to air heat pump only gives 30-50 %”. This is a critical article about how much you can actually save on an air to air heat pump.
Substantial increase in the use of heat pumps	“Every third detached house in Norway has installed a heat pump, but 40 % increase their electricity consumption after installing the pump”. This is a critical article with the results from Statistics Norway, showing that many households did not reduce their electricity consumption.
Have you remembered to clean the heat pump?	An article that reminds consumers to clean their heat pump regularly, if you want it to last and give a maximum effect.
Poor quality on heat pumps	A Swedish insurance company tells us that consumers have reported damage on 62000 heat pumps 1999-2009. The quality is said to be poor even on expensive pumps.
Environmentally friendly environmental bomb	The heat pumps are filled with environmentally damaging gases, and we are expecting masses of discarded heat pumps in the years to come.

A general theme from the newspaper articles is a review of pros and cons of the air to air heat pump. Almost all articles mention economic savings and comfort, some mention the environment and indoor climate. The sample above shows some examples of these general themes. The newspaper articles are not necessarily positive, quite a few points to the disadvantages of air to air heat pumps compared with other heating technologies, often with the intention of “revealing” something.

Table 4-2: Advertisements

Headline	Text excerpt/summary
(Daikin) Design model	“Daikin Emura, a brand new model air to air heat pump that for the first time combines exclusive design with energy efficiency in top class (...) the result is a heat pump that blends into every modern home”.
Panasonic heat pumps (TV commercial 2010)	A famous Norwegian artist is chopping wood in the forest, but admits that he really doesn't need any wood, as he has bought a Panasonic heat pump. However, he wants the cosiness of the fireplace, so he watches it on TV instead. http://www.youtube.com/watch?v=IejbuxdGaxQ&feature=related
The Design model from General heat pumps (TV commercial 2011)	A dwarf presents the new design model, customized to fit Nordic conditions. He likes it particularly well because it can also distribute heat at his height, closer to floor level, and his wife likes it because of the design. http://www.youtube.com/watch?v=2tPTInJJS2U
Panasonic heat pumps (TV commercial 2012)	Never have cold feet again! Everyone gets slippers for Christmas, but with a heat pump you don't have to use them.

There is, obviously, quite a different tone to the air to air heat pump advertisements. Similar to the newspaper articles, saving money is a key message. Additionally, the advertisements promote increased indoor comfort and good design. The latter seems to be of importance, as heat pumps traditionally were viewed as rather ugly, like we described in the previous section.

5 Danish study on air-to-air heat pumps, comfort practices and electricity consumption

By Toke Haunstrup Christensen and Kirsten Gram-Hanssen, SBI

This chapter summarizes the main results of the Danish study *Varmepumper og elforbrug – betydningen af ændrede komforttemperaturer*, which was carried out by the Danish Building Research Institute (SBI), Aalborg University, in cooperation with a number of Danish partners (the electricity companies SEAS-NVE and Lokalenergi and the consultancy company IT-Energy ApS). The project run from 2009 to 2011, and the aim of the project was to study how the installing of air-to-air heat pumps in dwellings and summerhouses affects the daily comfort practices of the residents and the related electricity consumption for heating. The study, which was supported by the Danish research programme *ELFORSK*, combined quantitative and qualitative methods. Heat pumps in summerhouses were included in the project as the installing of air-to-air heat pumps as replacement of direct electric heating is widespread in summer houses.

In the following, main focus will be on the results for dwellings as these are the most relevant for a Norwegian context, while the main findings for summerhouses are only briefly summarized in the last section. More details about the study and its results can be found in Christensen et al. 2011.

5.1 Background

Air-to-air heat pumps are promoted in Danish energy saving campaigns as an energy-efficient alternative to direct electric heating (usually convection heaters) in dwellings and summerhouses. Even though electric heating is not widespread in Danish housing (as compared to e.g. Norway), it is estimated that about 199,000 dwellings, or 8% of all single-detached, semi-detached, terraced and farm houses, are heated by direct electric heating. Hereof, only about 7,700 have a heat pump as their primary heating source (Dansk Energi 2010). In addition, approximately 8 out of 10 of the 215,000 summerhouses in Denmark have direct electric heating installed, while only about 1 out of 10 has an air-to-air heat pump (Statistics Denmark 2010 & Kofoed et al. 2010). Thus, there is a considerable potential for electricity savings by replacing existing direct electric heating by (air-to-air) heat pumps in Danish dwellings and summerhouses. By 2010, the Danish Energy Agency estimated that about 75,000 air-to-air heat pumps were installed in Denmark (Wittrup 2010).

In principle, and if installed and used correctly, air-to-air heat pumps can reduce the electricity consumption for heating by a factor of approximately three compared to direct electric heating. However, changes in comfort practices following the installing of heat pumps might have an effect on the actual electricity savings – e.g. if the residents tend to increase indoor temperatures, this would have a negative impact on the overall reductions in electricity consumption. The aim of the study *Varmepumper og elforbrug – betydningen af ændrede kom-*

forttemperaturer was to investigate possible changes in comfort practices and their potential influence on the actual electricity savings.

5.2 Methods

The study combined a questionnaire survey with qualitative interviews, analysis of electricity metering data from the electricity companies and technical inspections of heat pumps.

In total, 2,793 households were invited by mail to participate in the survey in 2010. The sample was drawn from lists of customers with heat pumps installed in their summerhouse or permanently occupied dwelling. The lists were provided by the two Danish electricity companies that participated in the study and included customers from two Danish regions (eastern Jutland and the western and southern part of Zealand). The online-questionnaire was completed by 681 respondents (24% response rate). However, these also included customers with other types of heat pumps than air-to-air heat pumps. Excluding these resulted in a final sample with 481 respondents; 405 with a heat pump installed in their dwelling and 76 in their summerhouse.

The questionnaires were later combined with metering data of the annual, billed electricity consumption for the houses delivered by the two electricity companies. These data were used for statistical analysis of the impact of air-to-air heat pumps on the annual electricity consumption. As it was not possible to get metering data for all houses, the sample for this part of the study was narrowed down to 180 respondents.

Twelve survey respondents were selected for face-to-face, semi-structured interviews with the aim of getting detailed descriptions of their use of the heat pump and how it was integrated into the comfort practices of the household (including possible changes in heating and/or air-conditioning practices). Respondents were chosen in order to ensure variety in the sample with regard to heating system (both houses with the heat pump as the only heating source or in combination with other heating sources), development in electricity consumption (both increase and decrease), household composition (with or without children living at home) and, finally, an approximately even distribution between dwellings and summerhouses. Also, some of the respondents who had reported in the survey that they used air-conditioning for 5 days or more during an ordinary summer were included.

The interviews lasted about one hour and covered a number of overall themes: General information about the dwelling/summerhouse, daily comfort practices and changes in these, the purchase and use of the heat pump, other changes in energy consumption, interest in environment and energy consumption, and general information about the household. In six interviews, also the spouse participated. Thus, 18 interviewees were interviewed in total.

5.3 Main findings for dwellings

5.3.1 Survey and metering data

For respondents with an air-to-air heat pump installed in their dwelling, the survey shows that the majority (86%) used direct electric heating as their primary heating source prior to the heat pump installation. Almost half of these respondents (44%) indicate that the heat pump is now their primary heat source, while a similar share (41%) indicates that direct electric heating is still their primary heating form. Only 11% report that the heat pump is their only heating source. Thus, it is common to combine heat pumps with one or more other heating sources – predominantly direct electric heating (at least 36% of all dwelling respondents) and/or a wood-burning stove (49% of all dwelling respondents). Of those who had a wood-

burning stove before the heat pump installation, 39% report that they use less wood after they got the heat pump, while only 3% indicate that they use more. This indicates that the heat pump in some cases partly replaces firewood.

Regarding the reasons to purchase the heat pump, most dwelling respondents indicate “to save money on heat consumption” (72%) and/or “to save energy” (63%). In comparison, only about one-third (38%) indicates that improving the comfort was among the reasons. Thus, the economic rationale has a high priority – at least in the respondents’ post-rationalization of the reasons for the purchase of the heat pump.

In relation to the heating and comfort practices, 23% of the dwelling respondents indicate that heat is turned on for a shorter period of the year than before the heat pump installing, while 17% indicate that heat is turned on for a longer period and 51% reports no change. About half of the respondents (55%) report that they have the same indoor temperature as previously, whereas 30% indicates that they generally keep their temperature higher and only 5% that they keep a lower temperature.

All in all, the survey results for dwellings indicate that only moderate changes in comfort practices take place after the installing of the air-to-air heat pump. However, a considerable sub-group (23%) reduces the length of the heating season (possible added energy saving), while 30% increases the indoor temperature (possible reduced energy saving). Taking this into account, substantial reductions in electricity consumption for heating should be expected. The analysis of the metering data shows that the installation of the heat pump results in an average annual electricity saving of approximately 2,000 kWh (degree day corrected) the first year after the installation. Detailed, model-based analysis (Gram-Hanssen et al. 2012) indicates an overall rebound effect of about 20% for the dwellings participating in this study; this means that about one-fifth of the potential electricity savings of replacing direct electric heating with air-to-air heat pumps is not realised in practice due to changes in heating and comfort practices such as heating more space or having a higher indoor temperature.

5.3.2 Qualitative interviews

Eight qualitative interviews were carried out with interviewees with an air-to-air heat pump installed in their dwelling. Even though the survey results indicate that the interest in saving money and energy on heating were among the most important reasons for the initial decision of purchasing an air-to-air heat pump, the energy and money saving aspects were generally not emphasised in the interviews. Instead, the interviewees typically emphasised non-economic advantages of the heat pump such as less moisture in the air, better air quality and better “circulation” of the indoor air. For instance, Richard & Irene Rasmussen (all interviewee names are pseudonyms) explain that they do not need to air their living room as often as previously; they think that the heat pump clear the air. Examples like this indicate that even though the economic aspects may play an important role for the decision to install a heat pump, other things such as improved air quality play a more central role for the informants’ later experience of the heat pump.

The installation of the heat pump has been followed by an increase in the annual electricity consumption in four of the eight dwellings – but for various reasons. In two of the dwellings, the heat pump was installed in connection with a new-built extension of the original house. One example of this is Ellen & Michael Andreasen, who built a 30 m² extension (garden room) to their existing house (which is heated by district heating). Ellen & Michael decided to install a heat pump in the garden room because it was cheaper in installation costs compared to central heating. Also, they regarded it as an advantage that the heat pump could be used for air-conditioning in the summer. After the heat pump installation, their annual electricity consumption has increased approximately 60%. The technical inspection of the heat pump and calculations of the theoretical energy need indicate that the heating of the garden

room only explains about half of this increase, while the remaining part (about 1000 kWh/year) probably is caused by the residents' frequent use of the heat pump for air-conditioning in the summer. Ellen & Michael explains that they switch on the air-conditioning if it is hot in the garden room and/or in the house, and they estimate that they use the air-conditioning more than 15 days per year.

Richard & Irene Rasmussen represent another example of increased electricity consumption. In their case, the heat pump replaced oil-based central heating in their living room and kitchen. They installed the heat pump in order to reduce their fuel oil costs. The result has been a moderate increase in electricity consumption (about 20%) and a significant reduction in annual fuel consumption (from about 2,000 to about 1000 litres/year).

A third example of increased electricity consumption is Jesper Holm, who together with his wife lives in their former summerhouse, which has been turned into their permanently occupied dwelling. They installed two heat pumps in relation to a thorough renovation of the house at the time they moved into the summerhouse, which was followed by an increase in electricity consumption of about 90%. This increase is likely to be closely related with the change in the couple's use of the house (from summerhouse to permanently occupied dwelling).

The examples above illustrate the complexity of reasons behind changes in electricity consumption. There are a number of reasons why the potential electricity saving effect of heat pumps in some cases is (partly) outbalanced by changes in practices and/or general increases in comfort and housing standards. These include: An extension of the heated floor area (Ellen & Michael Andreasen), using the heat pump for air-conditioning in the summer (Ellen & Michael Andreasen), replacing a previous non-electric heating form with a heat pump (Richard & Irene Rasmussen) or changes in the use of the house, which are not necessarily connected with the installing of the heat pump (like in the case of Jesper Holm and his wife).

On a more general level, the interviews suggests that the installation of heat pumps are often followed by changes in heating and comfort practices that implies higher comfort standards, which (partly) outbalance the potential savings. A good example of these "general increases" in comfort standards, which supplements the previously presented examples, is Helene & Kenneth Hansen, whose heat pump replaced direct electric heating in their kitchen and living room. Even though the heat pump is their primary heating source, Helene & Kenneth have only realised a 10% reduction in the household's electricity consumption. This seems to be partly explained by higher comfort in the shape of higher indoor temperatures:

Kenneth: We have probably got a higher temperature in here [in the living room and kitchen].

Helene: Yeah, previously we were satisfied with 20 degrees (...)

Kenneth: (...) now its 21.5, so we have actually raised the indoor climate – the temperature, right, since we have got the heat pump. In a way, we have allowed ourselves a bit of luxury.

Previously, the Hansen family kept the indoor temperature at 20 degrees in order to save money, but now they have increased the temperature as they perceive heating with the heat pump as less expensive than direct electric heating.

Summing up, the study of air-to-air heat pumps in dwellings shows that even though there are realised considerable electricity savings by replacing direct electric heating by heat pumps, the theoretical potential for electricity savings are not fully realised due to a variety of reasons. These includes – among other reasons like replacing wood fire for heat pump or extending the heated floor area – a general tendency towards higher comfort standards, particularly

related to increased indoor temperatures, and to some degree also the use of air-to-air heat pumps for air-conditioning.

5.4 Main findings for summerhouses – a brief summary

For summerhouses, the metering data analysis shows *no significant* reduction in the average electricity consumption before and after the heat pump installing. This indicates an overall rebound effect of about 100%, which is remarkably high. The interviews and the survey show that this is mainly due to changes in heating and comfort practices of the summerhouse owners; higher indoor temperatures and keeping the house heated during the entire winter. The latter is the most important change, which is done by the summerhouse owners in order to prevent moisture problems, making the summerhouse more comfortable for use for shorter periods (e.g. staying there over a weekend in the winter time) and for the convenience of not having to empty pipes or the toilet cistern for water before winter (frost-proofing). The interviews indicate that the purchase of the heat pump is part of the summerhouse owners' vision of making the summerhouse more comfortable in general; therefore, the interest in saving money (or energy) seems to play a minor role.

6 Theories of practice

6.1 Practice theory and consumer research

The heat pump project mainly utilizes a practice theory approach. By this we mean that we consider household energy use to be part of consumers' everyday consumption practices. In this section we describe the development of practice theory as it is used in consumer research today, mainly by giving a review of what we consider to be relevant studies applying practice theory to the types of empirical data we intend to produce in the project's empirical parts. At the end of part 6, we return to the discussions on the operationalization and use of practice theory in this project specifically.

The "practice" concept, and the theories behind it, has a long and complex history within the social sciences. Authors like Heidegger, Wittgenstein, Weber, Foucault, Latour, Giddens and Bourdieu have been called on as practice theorists, and the "practice theory" has been claimed to be present in anthropology, sociology and philosophy for a number of years. In sociology, Pierre Bourdieu and Anthony Giddens have discussed the need for the concept of practices in understanding the issue of structure and agency (Halkier et al. 2011). In recent years, Reckwitz (2002) has given a detailed review of practice theory in the light of other cultural theories, while Warde (2005) discuss practice theory in consumer studies. Both these contributions will be examined more thoroughly in this chapter. With the present empirical context being energy use and technologies in households, we concentrate on how the notion of a theory of practice has been presented in modern consumer research. Basically, this means that we take Alan Warde's article *Consumption and theories of practice* (Warde 2005) as our starting point, but that we also include some insights and points from Andreas Reckwitz' article *Toward a Theory of Social Practices. A Development in Culturalist Theorizing* from 2002.

Warde's article starts from the observation that the vast literature on consumption lacks some kind of theoretical consolidation and that this is not only because the field of consumption studies is multi-disciplinary, because there is also a set of problems within the different disciplines, like sociology. He imagines a perspective that might offer some new insights in how consumption is organised and how it should be analysed.

He then considers the list of theorists mentioned above in an attempt to identify some elements in a theory of practice, but has to conclude that "*given their differences, no authoritative or synthetic version is available*" (s. 132). He still insists that there is something out there that meaningfully should be called theories of practice, but that they have to be defined by something else than their theoretical coherence. It is possible that the most fruitful approach is to define practice theory negatively, by demonstrating what it is not and what it is developed against.

Building on an article by Schatzki on social practices, Warde claims that what is tempting about practice theory is that it is neither individualistic nor holistic. It describes social organi-

zation as something different from contracts between individuals, without falling back on some kind of holistic perspective on culture or social totality.

To place the object, here practice theory, between two extremes he wants to distance himself from seems to be a standard rhetorical figure with Warde. Not in the sense that he demands “middle range theory”, but that he defines his own solution as a kind of “third way”. It is interesting to see how he positions himself versus two of the central founding fathers of practice theory, Bourdieu and Giddens, and how both, according to Warde, fail to live up to their own programs.

Commenting on Bourdieu, who always is a central point of reference for the study of consumption, Warde claims that there are promising elements for a future theory of practice in i.e. *The Logic of Practice*, but that these insights or elements fail to inform the empirical analyses in *Distinction*. It seems as if Warde means that Bourdieu, in *The Logic of Practice*, is able to see the agent as both determined and free, simultaneously, but that the element of freedom tends to disappear in *Distinction*. That Bourdieu, even if he distances himself from structuralism, nevertheless ends up in a kind of structuralist position. Warde writes: “*For he did not employ his theory of practice much in Distinction, being more concerned with the relationship between habitus and capital*” (s. 136). Both Bourdieu’s concept of habitus and his concept of field have been criticised for giving a too determined view of human practice and human agency. I feel that this basically is a correct description of how Bourdieu’s work has been received. If the critique is fair is not up to me to decide, but it is certainly a critique that Bourdieu would disagree with.

Versus Giddens, Warde interestingly gives the opposite comments. Here, he claims that Giddens delivers promising practice theoretical perspectives in *The Constitution of Societies* and some other places, but that he forgets his own teaching and ends up with an almost completely voluntaristic analysis when he describes and discusses life styles in *Modernity and Self-Identity*.

This view has been formulated by others: “*By putting too much emphasis on spontaneous and individual creation of the self, one tends to vastly underestimate the strength of routines, cultural uniformity and market based coercion and constraints on the life style choices of the individual* (Strandbakken 2007:69).

We hope it is not necessary to mention that these points of critique do not mean that Warde, or others, regard Bourdieu and Giddens as failures because they find it difficult to always see individuals as both determined and free. This duality is very hard to demonstrate in real, empirical analysis, even if it is quite easy, theoretically, to demand that the researcher ought to consider it. So, the practice theory relevance of Warde’s double critique and his plea for an intermediate position is basically a vision or a programme: This is how social science and consumer studies ought to be!

Gert Spaargaren formulates this insight in the following way: “*... try to develop a conceptual model which combines a focus on the central role of human agency with proper treatment of the equally important role of social structure*” (Spaargaren 1997, s. 15).

Another attempt at defining an intermediate position is Warde’s double distancing from economists’ rather one sided focus on use value, utility and demand on the one hand and cultural theorists’ equally one sided focus on symbolic value on the other. A possible paradigmatic example might be automobiles: It is probably worse to claim that the car is not a means of transport, than to claim that it is.

In order to support this position between economists’ use value and cultural theorists’ symbolic value, Warde gives this long and comprehensive definition of consumption:

"..., I understand consumption as a process whereby agents engage in appropriation and appreciation, whether for utilitarian, expressive or contemplative purposes, of goods, services, performances, information or ambience, whether purchased or not, over which the agent has some degree of discretion" (s. 137).

This means that according to Warde we so far have identified three characteristics for a practice theoretical perspective on the sociology of consumption, three points that will help us place the contribution in relation to other research.

- Practice theory seeks to study human actors between freedom and determinacy, between choice and structure
- In the field of consumption it insists on considering use value and symbolic value simultaneously, in order to avoid a half blind over emphasis on one of them
- Practice theory is more interested in the ordinary and common, than in the spectacular, not the least because it aims at studying structures and routines of everyday life.

The perspective has a number of elements or characteristics, like approaches, concepts and language. This is a set of concepts that works together, but here we divide it into single elements. For this part we mainly use Reckwitz' article "Toward a Theory of Social Practices. A development in Culturalist Theorizing" in *the European Journal of Social Theory* 2002. Reckwitz defines the concept of practice in this way:

"A 'practice' (Praktik) is a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz, s. 249).

He analyses practice theory as a subcategory of cultural theories. Bourdieu worked on the concept in *Outline of a Theory of Practice* (1977), Giddens used practices as an element in his theory of structuration (1984), and Foucault analysed the relationship between agency and structures through several publications. However, Foucault's work seems not to be used very much in the further development of practice theory today.

Common to all the above authors is the inspiration from late Wittgensteinian philosophy. At the core of his thinking we find the concept of "language games". The language has a set of different tasks (not only the task of describing the "real world"), for example to ask questions or express feelings. To use language is to take part in a game with a set of rules that you may or may not follow. Wittgenstein argued that we must not seek to find the real or objective world, but to see how people use language in different ways. Science and Technology studies, and Actor Network theory also plays a role in the making of a theory of practice. Here, objects become central in analysing a practice.

A fundamental aspect of theories of practice is the concern with *everyday life*, and to present human agency as driven by habits and routines, not only reflexivity and rationality.

Homo economicus, homo sociologicus, and cultural theories

The main critique of the theories of practice is its lack of a superstructure, or meta level. It is not a grand theory. But it is, according to Reckwitz, part of what he defines as cultural theories. In this lies a focus on symbolic structures of meaning. Cultural theories can be compared with the other forms of modern social theory in the following way:

Key elements:	Homo economicus	Homo sociologicus	Cultural theories
The conditions of human action	Individual purpose, interest and intentions	Collective norms and values	Symbolic structures of knowledge
Social order	A product of the combination of single interests	Normative consensus	Shared knowledge create meaning
The place of the social	The level of intended and unintended consequences of actors interests	A social consensus of norms and roles	See table below for the difference within cultural theories
Unit of analysis	Single actions	Normative structures	(Practices)

Cultural theories deal with the implicit knowledge, homo economicus and homo sociologicus does not. It is the tacit layer of knowledge that allows such symbolic structures and organisation of reality (for example language).

Four versions of cultural theory

The main difference between practice theory and other cultural theories is that it “situates the social in a different way”.

	Mentalism	Textualism	Intersubjectivism	Practice theory
The place of the social	The human mind (conscious or unconscious)	Texts (discourse, signs, symbols)	Symbolic interactions	Practices
	Internal	External	External	External

The social is situated in the practice and is thus the smallest analytical unit. A practice is interconnections between all these elements; it cannot be reduced to one element alone. It has set patterns, but the individual can “fill” the practice with their own and unique actions. The individual is a “carrier” of the practice, but it does not, however, mean that practices cannot be changed. Often, practices are defined and developed in relation to other practices.

The elements of a practice

Body: The body is at the core of practice theory. All practices contain routinized bodily activities. The body learns to do something in a specific way. But the body is not only an instrument for the agent to use; the practice itself contains these bodily activities that the individual performs.

Mind: In addition to routinized bodily activities, practices contain routinized mental activities, and the two are connected. When an individual carries a practice, it carries certain patterns of bodily and mental activities that is needed to execute this practice. This means that the mental activities are not a part of the individual itself, but of the practice.

Things: Objects can be part of a practice, and the routinized bodily and mental activities contain instructions on how to use things within a practice. Objects can also form a practice; it

can make it possible or impossible to perform. Reckwitz stress that routinized and stable subject-object relations reproduce the social.

Knowledge: The knowledge in a practice is a specific understanding of the world. It is often implicit and historically and culturally specific. It is this knowledge that holds individual behaviour together and forms a practice. The knowledge is collective, never individual. But it is interpreted by individuals. This knowledge contains of a “know-how” element, feelings and intentions.

Discourse/Language: Discursive practices in only one of many other types of practices. Language and discourse is not more significant than other forms of action. A discursive practice also contains all the other elements of a practice, and the language is routinized.

Structure/process: Structure = routinization. Reproduction of social order. “Structure is temporal and always implies the possibility of breaking down in new events which do not conform to the code”.

The agent/individual: The social world is populated by different practices that the agent carries. This does not mean that they have no autonomy, individuals act within practices based also on their own understanding of the world, their intentions, feelings and level of knowledge.

What can practice theory be used for?

1. An analytical tool for empirical studies that opens up new ways of dealing with the social realm
2. A positioning in the world (ethical and political consequences)

Overview: Practice theory and consumption

Reckwitz’ aim is to work out the main characteristics of practice theory, Warde sets out to show the applicability and consequences of a Theory of Practice for analyses of consumption, and finally Gram-Hanssen (below) tests the Theory of Practice on residential energy consumption with the help STS, (though this does not disturb this particular observation).

Warde starts out his article with the observation that research on consumption has lacked theoretical consolidation, and his aim is to investigate, and indeed argue that Theory of Practice could assist in this respect. Warde believes that even if Theory of Practice is a fragmented field, it “provides new insights into how consumption is organized and how it might best be analyzed” (p. 132). He explicitly says that his contribution owes much to the overview of Theory of Practice given in Reckwitz (2002), (in brackets: Reckwitz do actually mentions consumption as one (of several) examples of practice (Reckwitz: p. 249)). Warde finds that consumption is central as a part (“moment”) of practices, as most practices require and entail consumption. In this connection he highlights a point that is well-known at SIFO: the consumption should not be viewed as restricted to market exchange, but rather be understood as more holistic from planning to buying to usage (including co-production and repair) and finally disposal. This implies, according to Warde, that activity generates wants, rather than the other way around.

According to Warde are the two key sociological questions concerning practices:

- *Why do people do what they do?*
- *How do they do those things in the way they do?*

This leads us to another interesting point, and that is the central place of the term “routine” in a theory of practice, which Gram-Hanssen problematizes more directly than Warde do, which

might not be fully surprising as Warde introduced the term ordinary consumption, and in this emphasizes a large share of consumption is routinized. It should be noted however that

Warde in this particular contribution highlights that an implication of a theory of practice “is that the source of changed behavior lie in the development of practices themselves” (p. 140). Warde initially highlights what he sees as the components of the ‘nexus’. The nexus is what forms and sustains a practice. The three components are understandings, procedures and engagements, the relationship between these three in individual practices may vary independently (of each other). As highlighted by Gram-Hanssen does Warde use empirical findings from motoring in his contribution also to illustrate this point, whereas Gram-Hanssen then uses a more interconnected example of residential energy use. This is also explicated by Warde as he says that he has not touched the issue of where the boundaries between two adjacent practices lie.

In Warde’s view does the approach of the Theory of Practice assist in shifting the analytical focus away from a less fruitful focus the consumer as a human animal and on personal expressions, and over to how practices are organized and the place (‘moments’) of consumption herein. He also sees the Theory of Practice as an antidote to view consumption exclusively as sign-value, as conscious communication.

Finally, with regard to the work on a new focal point for SIFOs research: In Warde’s view does the Theory of Practice offer a new insight into the continued growth in consumption, in spite that increased levels of consumption apparently does not give increased well-being or happiness.; exactly the point that consumption can be viewed as moments in a practice, and that these practices are what matters to people, and not the things in themselves.

6.2 Empirical examples of the practice theory approach in modern consumer studies

6.2.1 Kirsten Gram-Hansen: Understanding change and continuity in residential energy consumption

Gram-Hansen claims that practice theory was introduced (or re-introduced) «a couple of years ago» because consumer research had had a focus on symbolic/cultural/communicative aspects of consumption for too long, and – accordingly – too little focus on routines and ordinary consumption. Of the newer contributions to the field, she mentions Schatzki 1996 & 2002, Reckwitz 2002, Warde 2005 and Shove & Pantzar 2005. In addition, she refers to Gronow & Warde (eds.) 2001, about ordinary consumption. Philosophically, Wittgenstein is part of the background, while the social science tradition is represented by Giddens (the early Giddens), and with Bourdieu; both in order to deal with the actor-structure dualism. One problem with these approaches is that one might define everything one likes in modern social science as “practice theory”, which would appear to be rather unfruitful, but Gram-Hansen avoids this trap.

Starting from the aforementioned four modern contributors (Schatzki, Reckwitz, Warde plus Shove and Pantzar) she identifies how these writers imagine that practices are held together, how they are gathered and stay gathered. From these contributions she defines an “essence” of four points, consisting of what seems to be relevant for a study of energy use in households. These central elements (identified in the literature), holding practices together, are:

1. Know-how and embodied habits
2. Institutionalised knowledge and explicit rules
3. Engagements
4. Technologies

With an empirical focus on the energy use of households, we here see practice theory applied to the field of consumption or life styles. In addition, the focus on technology makes it seem fair to incorporate or to build on science studies/actor-network theory in the analyses. SIFO tried something similar in a study of terrace heaters.

Gram-Hansen mainly draws on two contributions from STS; transition theories and theories of domestication; both clearly relevant to questions of new technologies, everyday use etc., and hence, relevant for a study of heat pumps. Transition theory uses a three level intellectual framework; niches, regimes and landscapes, in order to analyse how technological changes spread bottom-up as well as to-down. Domestication of artefacts and technologies in different phases of consumption is clearly also interesting to our approach.

Her article looks at three empirical studies where technologies are viewed as something that both hold practices together, and contributes to their change. All the examples seem relevant to what we do within a technology and environment context; new household technologies, variation in energy use between technically speaking identical households and problems with the standby function.

She also directly addresses the difficult question of the limits of practices. “Energy use” should probably not be seen as a practice, since it is only a function or result of what we do to achieve other things, like space heating or cooling, freezing and preparation of food, running of pc’s and other consumer electronics, lightning etc.

So the «practices» should probably rather be things like preparation of food, pc use and space heating; activities that influence energy use without this being the reason for the activities or practices. Household energy use is not a field where autonomous individuals create the world and the practices. Rather, it is a field where heavy and standardised infrastructure rules. Voltage, energy regimes, prices, building standards, kitchen design, population density and a whole lot of other things contribute to reduce the level of consumer autonomy within each practice, even if Gram-Hansen shows that there is a real difference that might produce different end results with almost equal structural conditions.

To employ approaches from practice theory on more complex and diverse, technological and diffuse practices was the reason behind Gram-Hansen’s article. According to her, previous writes had mainly used the approach on simpler activities, like hiking (“Nordic walking”) and car driving. When we analyse how technologies and artefacts contribute to holding practices together, and to break them up as well, it gets both more complicated and more interesting.

Then, however, we have to consider both how routines have been made/are being made around technologies, and how technological change breaks down the preconditions for the old routines and enforces a period of reflexivity until new routine practices are established.

6.2.2 Monica Truninger: Cooking with Bimby in a moment of requirement: Exploring conventions and practice perspectives

The author starts her article by referring to previous studies of cooking, and the debates over what is good or “real” cooking. Her main point is that cooking with modern technologies probably demands just as much knowledge and skills as traditional cooking. She also mentions the controversies over making meals from “the bottom”, from scratch. Cooking should not be regarded only through its end result – the meal – but we might approach it as a kind of “doing” where practices are reproduced through a performance.

Bimby, or the Thermomix, is a so called multi-functional kitchen tool. It will weigh, cut, boil, mix and grind foodstuffs. The product has become very popular in Southern Europe, especially in Spain and Italy.

Theoretically, the author wants to combine the practice theory approach with convention theory:

1. Practice theory is used in a similar way to Shove & Pantzar (see below), with concepts and terms like stuff, image and skill. The argument is that a practice is held together by these elements, linked through the actor, when the practice is enacted.
2. Convention theory is a form of economic theory based on reflexive action rather than habit. The author mainly draws on Thèvenot, who argues that intentions and plans should be included in our analyses of individual action. This type of action is sub divided into three pragmatic regimes moving from close and personal, sensory and normative acts, via planned individual action and to argumentation.

By starting out from two different theoretical positions, Truninger claims to have covered all aspects of cooking. She shows this through an empirical material based on participant observation, interviews and collection of documents, articles and blogs.

The analysis starts with the description of a Bimby demonstration where the author and four friends participate. The session was recorded on film. She argues that such demonstrations are a key to observe dynamics of cooking, market relations and the cultural. In this context, negotiations over good cooking, technology, knowledge in addition to product sales meet; covering a lot of practices (or paradigms). The author analyses this demonstration from the two theoretical perspectives and indicates how convention theory and practice theory highlights different parts of it.

She concludes that actors and objects changes in and out of different regimes all the time, regimes where different practices prevail. In the end this is demonstrated through a table where the three different convention theory regimes (justification, regular planned action and familiarity) are described through elements from practice theory (images, objects, competences).

6.2.3 Turo-Kimmo Lehtonen: The domestication of new technologies as a set of trials

Theoretical backdrop: Lehtonen starts by explaining his view of the concept of “domestication”, seen as a tool for describing practices where the adaptation of new technology is present. It is a dynamic process where the actor and the technology influence each other, creating new meanings and practices. Thus, the actor does not passively adopt the technology, but is in a continuous negotiation with it.

In the extension of this concept, the author uses Latour’s idea of “trials”, or experiments, the stuff that happens when you incorporate a new technology into your life. It is a kind of definition process.

The term “attachment” is also used in this article, and denotes the link that is now created between the actor and the technology, that did not exist before.

Methods: The article builds on a qualitative study with 14 informants, interviewed several times in their own homes. The main aim is to understand the “technoscape” of their home as a whole, and to follow the dynamics between things and people as they emerge.

Trials:

1. Waiting. New technology must be considered as relevant for potential users. Informants tended to wait a while before buying something new, they wanted to see if the price decreased, or if a new model came out, or if they really needed it. Waiting is also a question of good moral and self-control (waiting is seen here as a trial). However, the informants thought that they were subjected to the technology; it would develop either way. (Digital television is used as an example). The informants have no definite answer to what makes a technology go from a novelty to a need, what trial is the most important.

2. Friends as experts. Seeing other people using the technology may also be a trial, it creates ideas of potential attachments or links. Then, we are learning through our friends if the technology is needed, and how it works. Friends are seen as a better source of information and knowledge than the media.

3. Adjusting. After the two first trials, if one decides to buy the technology, it needs to be fitted into the person's lifestyle. Whether or not it finds its place, the view on the technology has changed (e.g. when starting to use a mobile phone). When a new technology is introduced in the household, it changes practices and habits, things are arranged differently, relationships change.

Education: Technology must be learnt. Actors must learn to use a device through e.g. a manual. However, they often take matters into their own hands, self-educating and updating on the latest technology. It is also a kind of play with stuff, finding new ways of using it. The education may cause a more passive or more active relationship with technology.

Potential use, storage and disposal:

1. Use. When a piece of technology is first bought, it is used very actively, before it turns to a more habitual use. Even though it is not used as actively, it is very present in the household, but only surfaces when it is turned on/off, talked about, or changed. All technology is in the state of "potential use" all the time. When stuff is used habitually it is, according to the ANT language, stabilised.

2. Storage. The next process in domestication is when the technology is less used than before. Then it needs to be stored somewhere (old TV and stereo in the summer house for instance). It is often difficult to decide when something should go from use to storage, and things often ends up somewhere in between.

3. Disposal. The phase from storage to disposal is equally difficult. Stuff is often moved around in the house, extending the disposal phase. Arguably, the phases of consumption are not linear; they go back and forth between phases. The disposal phase is highly relevant for technological goods, as they often have a relatively short life. Consumers then, are not used to having a mobile phone for 5 years.

Concluding remarks: Domestication is a process with multiple phases that continue up to the final disposal of stuff. The concept of trials is used to open up the "adaptation" of technology, making it more dynamic and less predetermined. It is possible to define a lot of different trials in the relationship between people and stuff. Further, the trials produce knowledge and skills for actors. "A household is dynamically involved in the public world of the production and exchange of commodities and meanings" (Silverstone et al. 1992).

6.2.4 Elizabeth Shove & Mika Pantzar: Consumers, Producers and Practices: Understanding the invention and reinvention of Nordic walking

The article is partly based on the chapter Diversification of practice – the case of Nordic walking» by Katja Oksanen-Särelä and Päivi Timonen (below), published in a bigger report on outdoor life. Like Magaudda's article on digitalisation of music (see below), the authors start with emphasising the importance of studying material artefacts beyond their symbolic properties. A number of elements of everyday life contribute to forming, changing or maintaining practices. By putting material properties at the centre of a study of practices, Shove and Pantzar comes rather close to so called Actor-Network Theory, often associated with Bruno Latour, even if they do not so far as to give artefacts ("non-human actors") agency. Further, they argue that earlier attempts at formulating a theory of practice (Bourdieu, Giddens, de Certeau) has failed to see the importance of things. Reckwitz (2002), however, writes that practices are often enacted by using things/products in specific ways. The main argument of Shove & Pantzar then is that practices involve an active integration of things, meanings and competences, and that things contribute to making and reproducing practices.

By investigating the phenomenon of Nordic walking, the authors show how new types of production and consumption bring forth new practices (as well as the other way around). The unit of analysis then is the practice where the thing (the sticks) is included.

Walking. To walk, the practice of walking («doing walking») might be culturally specific; you need different competences for walking through Oxford Street at four in the afternoon from walking through a tropical rainforest. In addition you must have physical abilities, like strength and balance. Walking is both leisure (hiking, exercise) and transport (reaching a destination)

Walking with sticks. This is a special branch under the general heading of walking, where the equipment is central. What kinds of images come with sticks? They are often associated with helplessness and old age. The authors argue that by combining walking for leisure/exercise with sticks, actors create a new practice and challenges old practices.

The empirical material is mainly from Finland, where Nordic walking has been "performed" since the mid-nineties, and the UK where it is something rather new.

Finland

Three organisations; a sports institute, the tourist society and a sports equipment producer are central actors in the production of Nordic walking. They emphasise different explanations on how the practice has appeared, but they talk about it in the same way. Their main objective is to leave behind the notion that walking with sticks is for older and handicapped persons and make it be associated with nature, health and well-being.

The practice in Finland consists of the following elements:

1. Symbolic image and meanings. Health and well-being is central. Nordic walking engages far more muscles than common walking, and you coordinate the body differently, with fewer injuries. Fun activity for ordinary people.
2. Competence and skills; instruction manuals
3. Things (sticks and special shoes)

The institutionalisation of Nordic walking is to a large degree done by the aforementioned organisations who have promoted this form of hiking. They have had access to a large number of actors (carriers of the practice) who spreads, develops and reproduces it.

UK

In the UK the practice is much less known, and the cultural differences become important. There is not much culture for skiing there, but people do like to take walks. But it seems hard to define Nordic walking into the way the British do their walks. They still regard it as something for the old and fragile. One way around this could perhaps be to define it as a health measure, instead as a fun activity.

Products alone do not mean much; it is by creating meaning, symbols and skills (a practice) that makes the sticks. You have to create a whole new concept where consumers actually need a product. If you wish to export it you should not only export the products (the sticks), you have to export the whole practice.

6.2.5 Oksanen-Särelä, K., and Timonen, P: Diversification of practice – the case of Nordic walking

The most popular exercise among the Finnish public is walking, also prior to the introduction of Nordic Walking. This makes it an interesting case on how an everyday activity is transformed into a sport. This may lead one to concentrate on such a commodification of yet another area of everyday life. The authors are however more interested in the process of conceptualization.

The authors started by browsing Finnish internet pages on Nordic Walking, this helped them identify main actors. Further they went through the promotional material they had produced on Nordic walking. It is unclear whether the interviews with core persons they refer to, were made by themselves, or if they were found on the internet. The main empirical data they report on is however seven focus groups – with altogether 39 participants.

The theoretical framework is twofold: *practice theory*, where the authors cite Reckwitz (2002), and *frames* as Goffman understands them: clusters of norms with which people make sense of events, states of affair, and what others do. This includes an understanding of what would be suitable and non-suitable actions within a particular frame, as such frames are normative. To act within a frame would often be unreflective, although frames can also be deliberately worked on.

In the promotional material they found that they were of somewhat contesting orientation: on sports or on health, which can be taken as an indication of quite different user groups. The image of the activity changed somewhat over the first years: from a sociable group activity and over to a healthy and ‘effective’ exercise.

The authors find that users not only passively accept the frame that was created for Nordic walking by different stakeholders, but that the users/walkers actively are involved in re/producing the frame: However the idea of the ‘effectiveness’ of this exercise was the main reason given by the focus group participants, but the stretching as part of the Nordic walking as exercise has not been widely adopted. The social aspect of the activity that was highlighted early on did not fit the existing patterns of walking: that you walk alone or with a friend (and not a group). Skills in using the sticks properly were discussed in all focus groups, with a clear distinction of those who can and those that cannot do it properly.

The material aspects are not much discussed by Goffman in his development of framing. There the material is viewed as something that can or cannot “break the illusion of realism in a staged setting”, so the material has only the potential to disturb the frame, and it is accordingly back-staged. Thus it becomes apparent for the authors that practice theory has a lot to offer as the material is an elementary part of framing an exercise. This can be identified in the

empirical material where the focus group participants when framing walking refer to material stuff like sticks or sports clothing as indication of when walking is “sport”.

The linkages around the practices are also dynamic however, like the flexibility of the “sportive” framing where practitioners (walkers) can acquire only certain parts of it. Such flexibility is one of two criteria that can explain the success of Nordic walking – the other criteria being diverse linkages which strengthens the Nordic walking as a sport – images, competence and equipment)

The book chapter is an interesting example of how complex conceptualization and classifications of apparently routine everyday actions, and from the focus group studies three extensive frames around walking could be identified: Walking for a purpose; incidental, invisible walking which is a part of everyday routines; and proper walking where walking with sticks would fit in. In this regard the classification by Stebbins of free-time activities into casual or serious is brought in by the authors.

The results of the focus groups that are reported in this book chapter by Oksanen-Särelä and Timonen, are part of the empirical material used in Shove and Pantzar’s article in *Journal of Consumer Culture* (2005: 49), these authors do not however adopt the concept of ‘frame’. In Magaudda’s article in *J Cons Cult* (2012), cites Shove and Pantzar, but not this book chapter, nor Goffman.

PS: An interesting aspect that the moderator brought up in the focus groups, which one should think when doing focus group studies, is when it is *not* appropriate to use sticks.

6.2.6 Paolo Magaudda: When materiality ‘bites back’: Digital music consumption practices in the age of dematerialization

The article addresses the changes in the listening practices/music consumption following the introduction of new technologies, primarily streaming, based on 25 depth interviews with Italians between 15 and 30, carried out in two Italian cities between 2005 and 2006.

Magaudda has different lines of arguments that run simultaneously throughout the text. Theoretically, he primarily seeks to show that the so-called “dematerialization hypotheses” is a too simple model for understanding the changes in modern music consumption. Even with downloading technology /streaming solutions there is a too strong consumer focus on gadgets or materiality, as we see in the numerous articles on iPods, MP3 players, etc. He presents three trends in listening practices that all ties into specific material technologies.

There are possibly two flaws in an otherwise excellent article. First, the argument based on dematerialization also refers to the “carrier” of the music to be non-material, virtual. Although we constantly fetishize playing equipment, headphones etc. there is something qualitatively new in that the “work” itself is immaterial, that it is software. Second, the concept of dematerialization in an environmental context should also refer to the amount of material by weight or volume. The whole archive or collection of music may take up less space than one of the music cassettes containing 2 x 45 minutes of music in a reasonably poor quality.

But it is an important observation Magaudda makes, in that music streaming is not immaterial and that technology does not completely determines its use.

What makes the article relevant to us is that the author provides a reasonably thorough review of practice theory, based on the research tradition we have chosen to use in here (Schatzki, Reckwitz, Shove & Pantzar, Warde), but he also puts it in the context of the STS/ANT- tradition, which we also intend to do in the project, and links it to e.g. the interaction between humans and non-human actors. In addition, he draws some parallels to the anthropological and sociological approaches to material culture (Appadurai, Kopytoff, Miller).

Magaudda defines a "practice circuit" or a "practice loop" ('circuit of practice') based on the elements objects, representations and operations / actions ('doings'), in order to analyze three different technologies or technology-based listening practices, based on

1. streaming iPod, Mp3,
2. external hard drives and
3. vinyl records.

The first represents a new listening / distribution technology, the other represents a new use of a known technology (PC) while the third is about a certain kind of almost obsolete technology being rediscovered for various reasons.

The article concludes with three more or less empirically based figures to illustrate the three practices around each of these technologies. It is not clear as to how much these characters provide new insights.

6.3 Ann Swidler: What anchors cultural practices

Swidlers text tends to be a little difficult, but it is in some ways in the core of what we have discussed earlier. First, it places practice theory in the field of social research, analytically, in an interesting way. Second, it raises questions about definitions of practice, the relationship between the practices and similar themes.

Positioning

The historical sweep on practice theory is to be taken lightly. Too many writers have a tendency to read that "practice" is synonymous with "good sociology" (or social science) and then projecting the concept back in history (Weber, Geertz, Foucault, Goffman), or explain philosophical assumptions (Wittgenstein, von Wright). In some specific cases, it is an obviously interesting exercise, but in this context we are more interested in seeing which constraints the practice turn has (or should have) for an empirically oriented consumer research. Thus, in one sense or another, we talk about Schatzki 1996 or Warde 2005 as "year zero".

So what we mean by "positioning" here is less historical and more analytically determined. Swidler argues that practice theory "moves the sociological attention "down" from the conscious ideas and values, in the direction of the physical and the habitual' (p. 75). But at the same time, she argues, practice theory moves the attention 'up', from ideas located in individual consciousness and towards the impersonal arena we call 'discourse'. "A focus on discourses then reintroduces the world of language, symbols, and meanings without making them anyone-in-particular's meanings" (p. 75).

Delineations

After her argumentation on culture and structure, she asks the question "are all practices equal, or are some more equal than others" (p.79). Is it possible in all these practices (her example is 'material' and 'conceptual' preconditions for housing construction) to single out a few that are more central, more controlling than others?

She runs through different examples (gay identity in San Francisco, labor / capital relations respectively in England and Germany and American volunteer) in order to answer this question, but admits that she is unable to demonstrate that some practices 'anchors' others with the material she has at its disposal.

Yet she gives the reader three "remarks" at the end that she holds to be relevant to the problem:

1. it is relevant to ask whether all practices are similar with regard to their ability to create or prevent other social activities. She claims to have shown that at least in some cases, there are 'anchoring practices' that play key roles in the system reproduction of discourse and practices.
2. She will pay particular attention to practices that seem to anchor or reproduce rules, rules that define what things are (constitutive practices).
3. She has tentatively identified the types of social relationships that could conceivably reproduce these constitutive practices.

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Appendix

WP 2: Consumer's point of view (jan-juni 2013)

I denne arbeidspakken skal vi identifisere varmepumpepraksiser i norske husholdninger, og vi skal undersøke forbindelsen mellom brukere og teknologi. Målet er å få informasjon om hvordan varmepumpen faktisk brukes i husholdningen. Med denne kunnskapen kan vi identifisere energiintensive praksiser som både kan være forårsaket av endrede komfortvaner, men også manglende kunnskap og mindre god design og brukervennlighet. Disse kan videreutvikles til såkalte «policy instrument» eller anbefalinger i den avsluttende analysen.

Vi skal gjennomføre intervjuer med omkring 10-12 varmepumpeeiere i deltakernes egne hjem. Dette argumenterer vi i søknaden for at gir en mulighet for å forstå forholdet mellom hvordan det snakkes om energibruk i husholdningen, og hva som faktisk gjøres. Intervjuene skal gjøres i Oslo og Trondheim fordi resultater fra tidligere studier viser signifikante forskjeller i energikultur i det to ulike landsdeler, spesielt på grunn av forskjeller i elektrisitetspriser over tid.

Resultatene fra denne arbeidspakken skal presenteres på ECEEE summer study 2013. Dette vil endres noe dersom paperet må skrives før det empiriske materialet er samlet inn. Dersom det ikke presenteres på ECEEE, bør det skrives en artikkel umiddelbart etter endt innsamling, dvs. mai-juni 2013.

Det er satt av totalt 500 timer til denne arbeidspakken, fordelt på Nina (200), Pål (150) og Harald (150). Det er også satt av et driftsbudsjett på 20 000 NOK, samt et transkriberingsbudsjett på 15 000 NOK.

Forarbeid og gjennomføring av intervjuer

Rekruttering: Det kan være vanskelig å få folk til å stille opp på intervjuer hjemme hos seg selv, men fordi varmepumper ikke er et spesielt sensitivt tema, og folk flest er ganske opptatt av hva de driver med kan det tenkes at det er uproblematisk.

For å informere godt om hva informantene er med på kan vi først skrive et brev, og deretter ringe for å lage en konkret avtale. Dette må i så fall bli etter at informantene har vist interesse for prosjektet gjennom en av følgende kanaler:

1) Det er mulig å rekruttere noen informanter gjennom TNS Gallup eller Norstat, men vi har ikke alltid hatt like god erfaring med informanter fra rekrutteringsbyråene, for eksempel i fokusgrupper. Vi vil uansett ringe et rekrutteringsbyrå.

2) Det vil også kunne være mulig å rekruttere informanter gjennom NOVAPs hjemmeside www.varmepumpeinfo.no, eller deres Facebook-side. Ved hjemme-hos intervjuer kan hver informant få et gavekort på 500,- og være med i trekningen av en større premie, f.eks. et varmepumpehus (verdi ca. 1500,-).

Vi kan legge ut en annonse på lignende måte:

Forskningsprosjekt om varmepumper søker informanter!

Statens institutt for forbruksforskning (SIFO) studerer luft til luft varmepumper i norske husholdninger og vi vil gjerne snakke med deg som planlegger å kjøpe en slik varmepumpe. Alle deltakere vil motta et gavekort på kr 500,- og være med i trekningen av et varmepumpehus!

Ta kontakt med oss for mer informasjon!

3) Kontakte installatører direkte slik at vi for eksempel kan bli med på en installasjon, eller på en befaring før installasjon. Det er også mulig å kontakte utsalgssteder og produsenter direkte.

4) Legge ut en annonse på www.sifo.no

5) ta kontakt med aviser eller magasiner som er interessert i temaet: www.dinside.no, Vi i Villa, lokalaviser i Oslo og Akershus, bransjeblader og diskusjonsforum.

Rekrutteringen bør starte allerede i november-desember 2012 for å sørge for å intervju informanter i vintersesongen.

Intervjuer før og etter installasjon: Dette er ikke spesifisert i søknaden, men det kan være en fordel å intervju informantene før de får installert varmepumpe, samt noen måneder etter. Det ideelle tidspunktet ville være å intervju i januar-februar (de kaldeste månedene), for så å gjøre et intervju i april, på tampen av fyringssesongen. Vi vil blant annet kunne innhente følgende informasjon ved de to tidspunktene:

Intervju 1: Før installasjon

- Husholdningenes nåværende oppvarmings- og komfortpraksiser
- Forhandlingsarbeidet som har pågått (eller pågår) frem til avgjørelsen om å kjøpe varmepumpe
- Forventninger til varmepumpen
- Måling av strømforbruket før installasjon
- Måling av innetemperatur før installasjon

Intervju 2: Etter installasjon

- Endring i oppvarmings- og komfortpraksiser
- Husholdningenes erfaring med bruk av varmepumpe (Display, innstillinger, fjernkontroll etc. Hvem i husholdninger gjør det?)

- Domestisering av varmepumpen. Nye typer forhandlinger i hjemmet etter innkjøp.
- Måling av strømforbruket etter installasjon
- Måling av innetemperatur etter installasjon
- Tekniske forhold: er varmepumpen korrekt installert, rengjort osv.

Målingene av strømforbruk og innetemperatur kan både gjøres subjektivt (informantene oppgir følelsen av endring) eller objektivt (ved bruk av en termometer og avlesning av strøm gjennom strømselskapet). Her kan det være mulig å trekke inn laben for å hjelpe til med de tekniske målingene. Fordi vi ikke har slikt utstyr må vi også kontakte SINTEF, Enova eller NVE. Alternativt et energiselskap dersom vi bestemmer oss for å utføre objektive målinger. Vi kan gjerne bruke et energiselskap til å gi info om endringer i strømforbruk, men må jo uansett kontrollere for utetemperaturer o.l.

I intervjusituasjonen: Fordi vi ønsker å intervju husholdninger hjemme hos seg selv, er det særdeles viktig at vi ikke fremstår som overlegne rent kunnskapsmessig. Vi burde være maks 2 personer ved hvert intervju, en som hovedsakelig stiller spørsmålene og fører samtalen med informanten(e), mens en tar notater og eventuelt bilder, samt holder orden på opptakutstyret. Intervjuene bør være dyptgående og semi-strukturerte, for å få tak i praksis og ikke bare refleksjon. Det betyr at vi lager en intervjuguide der vi ønsker å dekke visse hovedpunkter, men at samtalen kan flyte friere innenfor disse rammene. Slike intervjuer varer vanligvis omkring 1 time eller lengre.

Utvalg: Det er mulig å tenke seg at flere personer fra husholdningen er med på intervjuet, slik at vi kan få forskjellige perspektiver på introduksjonen av en ny teknologi. Bakgrunnsvariabler som kjønn, alder og yrke kan også ha betydning innenfor det enkelte hushold for hvordan disse forhandlingene foregår. Oppvarmings- og komfortpraksisene i husholdningen kan også innefatte andre personer enn informanten.

Fordi det er svært sjeldent at luft til luft varmepumper installeres i leiligheter vil vi velge å fokusere på eneboliger (større og mindre), rekkehus og tomannsboliger. Det kan være bra å gjøre intervjuer i flere boligtyper og med husholdninger av ulik sammensetning.

Bruk av foto: Vi kan ta bilder av varmepumpens plassering i rommet (og kanskje sammenligne med et før-bilde for å se om rommet har endret seg). Det er også mulig å ta bilder av utedelen for å se om denne er korrekt plassert osv. Dette er relevant både for praksisendring, men også for forhandlinger om de estetiske dimensjonene ved varmepumpen.

Operasjonalisering av praksisteori i kvalitative intervjuer

I tillegg til forarbeidet og den mer praktiske gjennomføringen av de kvalitative intervjuene, er vi nødt til å diskutere hvordan vi forholder oss til det teoretiske rammeverket. For det første bør intervjuene være tilpasset den typen empiri vi faktisk er ute etter å finne, nemlig praksiser. Å intervju hjemme er ett slikt grep, et annet kan være å intervju flere fra husholdningen samtidig. Det kanskje viktigste grepet er å intervju i to omganger. Dette vil kunne gi god informasjon om domestisering og forhandlingsarbeid, samt endring i praksis.

Vi utfører prosjektet under den grunnleggende tanken om økologisk modernisering. Det vil si at vi i denne sammenhengen legger til grunn at et bærekraftig samfunn bør kunne utvikles ved bruk av eksisterende (og evt. ny) teknologi i et moderne samfunn.

I tillegg til praksisteori og økologisk modernisering trekker vi i søknaden frem Shoves begrep om komfort. Det er dermed viktig at dette blir et konkret tema i intervjuguiden. Her kan vi trekke inn hennes argument om en normalisering av stigende komfortstandarder.

Intervjuguider – før og etter installasjon av varmepumpe

Intervju 1: Før installasjon (jan-feb. 2013)
<p>Innledning</p> <ol style="list-style-type: none"> 1. Fortelle kort om prosjektet: forskningsprosjekt ledet av SIFO, vil finne ut mer om bruken av varmepumper i norske husholdninger, varer fra 2012-2014. 2. Beskrive og forklare intervjuet: Varighet (ca. 1 time), overordnede temaer 3. Anonymitet og samtykkeerklæring: Intervjuet blir tatt opp med diktafon, og det blir skrevet notater. Hvis det er mulig ønsker vi å ta noen bilder av varmepumpens plassering og lignende. Alle skriver under på samtykkeerklæringen.
<p>Bakgrunnsvariabler</p> <ol style="list-style-type: none"> 1. Hvor stor er boligen? (også notere oss hva slags type bolig det er) 2. I hvilket år ble boligen bygget? 3. Hvor lenge har dere bodd i boligen? 4. Hvor mange medlemmer har husholdet? (fordelt på kjønn) 5. Hvor gamle er husholdets medlemmer? 6. Hva jobber de voksne i husholdet med?
<p>Oppvarmingssituasjonen i dag</p> <ol style="list-style-type: none"> 1. Hvordan varmer dere opp huset i dag? <ul style="list-style-type: none"> - Er det noen rom som ikke varmes opp? 2. Hvem i husholdningen er ansvarlig for oppvarmingen? <ul style="list-style-type: none"> - Hvem stiller termostaten, bestemmer innnetemperaturen, sørger for at det er nok ved? 3. Hvor varmt har dere det hjemme i dag? <ul style="list-style-type: none"> - Opplevs innnetemperaturen i huset som behagelig? Når er eventuelt innnetemperaturen ubehagelig? - Varierer dere temperaturen i løpet av døgnet? (nattsinking, når man får besøk, på dagtid når ingen er hjemme) 4. Er det noen konflikter i husholdningen om hvordan dere skal varme opp, og hvor varmt dere skal ha det? <ul style="list-style-type: none"> - Hva går disse konfliktene ut på, og hvordan løser dere dem? 5. Syns dere det er vanskelig å få det varmt nok på vinteren? 6. Pleier dere å stenge av rom i boligen og ikke ha det like varmt overalt? 7. Har dere gjort andre energisparende tiltak hjemme? (isolasjon av vegger, dører, vinduer, loft, styringssystemer, skiftet ut annen oppvarming) <ul style="list-style-type: none"> - Har dere endret vaner rundt oppvarming av huset i løpet av den tiden dere har bodd her? (innnetemperatur, lufting, tørking av klær, tøfler/ullsocker inne, avstenging av rom)

Anskaffelse av varmepumpe

1. Hvor hørte dere først om varmepumper? (aviser, reklame, venner, familie, internett)
2. Når begynte dere først å tenke på å installere varmepumpe selv?
3. Kan dere si litt om hvorfor dere ønsker å installere varmepumpe? (spare penger, miljø, få det varmere, jevnere varme, inneklima, renere og tørrere luft)
 - Hvorfor valgte dere luft til luft varmepumpe?
 - Har det vært noen konflikter i husholdningen om dere skal ha varmepumpe? (estetikk, vedlikehold, for teknisk)
4. Hvor har dere tenkt til å plassere varmepumpen? (ta bilde, vise)
 - Var det enighet i husholdet om plasseringen av varmepumpen?
5. Hvilke rom vil dere varme opp med varmepumpen?
 - Skal varmepumpen være primæroppvarming, eller supplerende oppvarming?
 - Har dere tenkt på å bruke varmepumpen til kjøling om sommeren?
6. Er dere interessert i teknologi generelt? Har dere mange «dingser»?

Avslutningsvis

1. Er det andre ting dere ønsker å ta opp?

Intervju 2: Etter installasjon (mars-april 2013)**Eventuelle endringer i bakgrunnsvariabler**

1. Er husholdet det samme som ved forrige intervju?

De første erfaringene med varmepumpe

1. Hvordan har vinteren med varmepumpe vært?
 - Hvordan har dere benyttet varmepumpen til oppvarming? (primær, sekundær..)
2. Har varmepumpen hatt noen betydning i forhold til komforten i huset?
3. Kan dere vise oss hvordan dere bruker varmepumpen? (fjernkontroll, regulering av temperatur, innstillinger)
 - Hvem i husholdningen betjener varmepumpen?
 - Har dere opplevd noen problemer i forhold til styringen av varmepumpen?
 - Har varmepumpen fungert slik den skal (teknisk)?
4. Fikk dere noen form for opplæring eller veiledning da dere fikk installert varmepumpen? Hvilke råd, og har disse hjulpet?
5. Tror du at installasjonen av varmepumpe har endret strømforbruket deres noe? (mindre, som før, eller mer strøm).

Endringer i komfort- og oppvarmingspraksiser

1. Tror dere at dere har endret innnetemperaturen etter installasjon av varmepumpe?
2. Varmer dere opp flere/færre rom enn før?
3. Oppholder husholdet seg andre/flere/færre steder enn før?
4. Vil dere ha på varmen lenger med varmepumpe? (forlenge oppvarmingssesongen)
5. Hvordan føler dere at komforten i hjemmet er i dag?

Hytte

1. Er varmepumpe noe dere kunne tenke dere å ha på hytta? (dersom husholdningen har hytte, og den har tilgang på strøm).

Avslutningsvis

1. Er det andre ting dere ønsker å ta opp?

Forslag til informasjonsbrev med samtykkeerklæring**Informasjonsbrev og samtykkeerklæring for prosjektet «Energy Saving Technologies in Households: The Heat Pump»**

Statens institutt for forbruksforskning (SIFO) startet høsten 2012 opp et samfunnsvitenskapelig prosjekt for å studere varmepumper i norske husholdninger. Prosjektet har fått støtte fra Norges Forskningsråd. Hensikten med prosjektet er å studere nye energisparende teknologier og hvordan disse fungerer i de enkelte husholdningene. Målet er å utvikle økt kunnskap om oppvarming i norske hjem, og å finne ut hvilke tiltak som kan være fornuftige for å skape et mer bærekraftig samfunn. Prosjektet vil vare fra 2012-2014 og gjennomføres hovedsakelig av tre forskere hos SIFO.

Vi ønsker å snakke med husholdninger som planlegger å kjøpe en luft til luft varmepumpe vinteren 2012-2013.

Deltakelsen i prosjektet innebærer 2 intervjuer, ett før innkjøpet av varmepumpe, og ett noen måneder senere. Intervjuene vil bli gjennomført hjemme hos den enkelte husholdning. Intervjuet vil ta om lag en time per gang, og utføres av en/to forsker(e) ved SIFO. Vi ønsker deres personlige vurderinger og etter hvert erfaringer med luft til luft varmepumper.

Det er helt frivillig å delta i prosjektet og du kan på hvilket som helst tidspunkt trekke deg og kreve personopplysningene som er gitt anonymisert, uten å måtte begrunne dette nærmere.

Resultatene av studien vil bli presentert med full anonymisering av alle informanter.

Dersom du ønsker å delta i undersøkelsen, er det fint om du signerer den vedlagte samtykkeerklæringen.

Har du spørsmål i forbindelse med denne henvendelsen, eller ønsker å bli informert om resultatene fra undersøkelsen når de foreligger, kan du gjerne ta kontakt med oss på adressen under.

Samtykkeerklæring:

Jeg har mottatt skriftlig informasjon og er villig til å delta i studien.

Signatur Telefonnummer

Med vennlig hilsen
Nina Heidenstrøm
Statens institutt for forbruksforskning
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