Following up on Energy Refurbishments

A study of houseowner's refurbishment practice with Transition

Master Thesis by
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Abstract:

This report sum up a Master's Thesis at the study programme of Techno-Anthropology at Aalborg University. The project is part of an internship with the energy counselling company Transition ApS. The theme of this project is following up on energy refurbishments. This study has gathered data and experience from municipalities in North Zealand where Transition is counselling citizens. The approach of this study is participant observation and ethnography with a theoretical framework centred around Practice Theory, the Techno-Anthropological Competencies and the Living Lab approach. The report concludes with design guidelines for the follow-up process as well as the value of Techno-Anthropological competences in a professional context.

Contents

Preface

This report is a Master's Thesis written by Christian Bager Jakobsen, student at the Masters programme Techno-Anthropology at Aalborg University. I want to use this opportunity to direct a special thanks to Rasmus and Line from Transition ApS. for the warm welcome in Aarhus and because they gave me the chance to pursue the people behind the Excel sheets. I want to thank Mads Pagh Nielsen and Thomas Nielsen, for feedback and supervision through out the project until the very end. Finally, I want to thank my girlfriend Louise for keeping me up to the mark through the whole process and of course a big thanks to my little baby boy Felix, who dumped into my life this September.

Aalborg University, December 16th, 2020

Chapter 1

Introduction

In continuation of my case-based project within the organisation Energy City Frederikshavn I will carry out a Techno-Anthropological research project on the practice of energy refurbishments. Through my years as a Techno-Anthropological student I have shifted in my field of interest from a focus on the health sector and medical technology to the energy sector and energy technology in private homes. My specialisation grew during my Master's programme and lead me to an internship in the municipality of Frederikshavn in North Jutland to help incorporate energy refurbishments through citizen involvement in the form of Living Labs.

My drive was now to write a Master's Thesis about the same subject and contacts in Frederikshavn sat me up with a company in Aarhus which had helped the Municipality of Frederikshavn with several citizen meetings and information about energy refurbishments and electrical heat pumps. This company is Transition ApS., and after a meeting with the partners of the company we began a collaboration with my Master's Thesis in the field of Techno-Anthropology and Transition's working case with the municipality of Fredensborg.

The subject we agreed to work with was the the relationship between houseowners and energy refurbishments and how to follow up on energy screenings which Transition had been doing in Fredensborg for the last couple of years. The reason why Fredensborg sought out help to screen and implement energy efficient solutions in private homes of the municipality is because they aim to reduce their CO_2-emission with 25 % before 2020 agreed upon in the Climate and Energy strategy of the municipality in 2017. (Fredensborg Kommune, 2017) The initiative is a step towards a greener future which is necessary to overcome the wicked problem of Climate Change.

Climate Change is a wicked problem because it is complex and controversial problem area with no consensus on the definition of what the problem is or what a good solution is. It is in this socio-technical cross field with questions of sustainability, ethics and responsibility

a Techno-Anthropologist can act and what this Thesis will be about.

Next up I will shortly present the company I have been cooperating with and an introduction to the heating situation in Denmark. Then I will precede to present the municipality of Fredensborg where most of my informants live and lastly describe the process of energy screening.

1.1 The company Transition

Rasmus Jakobsen and Line Nørmark founded Transition Aps (from now on referred to as Transition) in 2014 as partners with offices in both Copenhagen and Aarhus. Transition has 12 full-time employees including Rasmus and Line, but has also 9 student workers and internships including myself. Rasmus is the CEO and has a master's degree in business administration specialised in the field of Energy from Aarhus University. Line is senior consultant and civil engineer specialised in energy and indoor climate from Aarhus University.

Figure 1.1: The logo of Transition

At Transition they work with the transition to the sustainable society, which is one of the company's mottoes. They work with counselling and facilitating processes within the areas of energy, environment and indoor climate. The projects in Transitions portfolio spans from private housing to big industry with focus on indoor climate and energy management (Nørmark, 2020). In the means of counselling, Transition has two ways of counselling. First, is the direct counselling and assessment on site whether it is with a citizen or an other company. Second, they have the role as impartial counsellor on the Danish Energy Agency's hotline for questions and advise on anything related to energy called SparEnergi.dk.

The great goal from the counselling being to save energy and convert heating sources from oil-fired boilers into electrical heat pumps. Because, other than being one of the individual heat sources of the future, the heat pump will be a essential part of a sustainable and intelligent electrical grid. This smart grid will help handle the increasing power from renewable energy sources as wind turbines.

1.2 Heating in Denmark

In 2019 the Danish household's energy consumption was 189,1 PJ (peta joule) making it 30,1 % of the total energy use in Denmark (Danish Energy Agency, 2019: p. 35). Out of the 189,1 PJ energy consumption in a year, 156,5 PJ or 82,8% went to heating up our houses and the rest of 32,6 PJ or 17,2% went to our electrical appliances. Compared to 1990 the energy consumption in 2019 have increased 2,2% which can be contributed to a lot of factors. The weather is one of the greatest factors when accounting for our household consumption, but it can not justify the increase alone. Our household consumption is so dependent on the weather and the climate, because of the temperature change. If it is very cold one year, then the consumption of energy to heat up our houses will increase as well. It also works in the opposite direction if the weather is warmer one year. That is why it is difficult to just compare consumption from different years without climate compensation.

The energy used for heating every m^2 of housing is in the period from 1990 to 2019 decreased by 20,4 %. The decrease can be explained partly by improvements of older house's insulation, partly by switching out old oil-fired boilers with more efficient natural gas boilers and by district heating installations. Along this movement, the requirements for new buildings in accordance to the building regulation needs to have a lower energy use per m^2 than existing houses. This must be seen in the context of that the heated area of Denmark increased by 25,7% from 1990 to 2017. (Danish Energy Agency, 2019: p. 36)

Up until the middle of the 1980's oil-fired heaters was the dominant heating source in Denmark after which district heating became the most widespread. As of January 1st 2019 the heating installations in Denmark was 64,8 % district heating installations, 15,1 % natural gas boilers, 8,4 % oil-fired boilers and 11,7 % others including heat pumps, electrical radiators and wood-burning stoves. (Danish Energy Agency, 2019: p.36)

Figure 1.2: An example of an air to air heat pump

The basic principles of a heat pump is that it produces heat based on feeding electricity to a compressor. The Heat pump can convert energy with a low temperature level to energy with a high temperature level, so the energy can be used to heating up a building for example. It does so by exploiting condensation and evaporation energy from a liquid refrigerant inside the pipes of the pump. For every kWh power the heat pump uses it typically produces 3-4 kWh heat (Birkkjær Lauritsen and Ingeniørskolen i Aarhus, 2015: 12). Heat pumps comes in different variations, but its principle of heating remains the same.

The simplest heat pump is an air to air heat pump, which circulates the air in the room and heat it up. In figure 1.2 there is an example of an air to air pump and where it is installed. This kind of pump excels in smaller or older houses, where there is not installed radiators or underfloor heating. It is especially popular in Danish holiday houses because it distributes heat through the air, but not a good solution in houses with more rooms.

In this case an air to water heat pump will be the substitute for the oil-fired boiler, as the heat pump can be connected to the existing network of water pipes. Instead of heating up the air, the air to water pumps uses the energy from the outside air and transfers it to the heat exchanger which then heats up the radiators or underfloor heating in the house.

The last type of heat pump used in Denmark is the ground source heat pumps, which works the same way as the air to water heat pump inside the house, but instead of using outside air it uses the ground to heat up the refrigerant in frost-proof pipes dug into the ground outside the house. Normally you would lay the pipes horizontally, but the demand for vertical digging has increases in recent years as not many houseowners has the space required for the pipes to lay horizontally (Jensen et al., 2011: p. 8).

Figure 1.3: The outdoor unit of an air to water heat pump

1.3 Case of North Zealand

The municipality of Fredensborg has 40.865 inhabitants spread upon an area of 112 km^2 with the four biggest cities being Kokkedal, Nivå, Humlebæk and Fredensborg. The municipalities in the northern part of Zealand are renowned for their high tax income and a rich nature and cultural life. The city of Fredensborg is famed for Fredensborg Palace and Palace Gardens which is a popular residence of the Queen of Denmark Margrethe II and her late husband Prince Henrik of Denmark and the famous Museum of Modern Art Louisiana.

The municipality of Fredensborg aims to reduce their CO_2-emission with 25 % before 2020 agreed upon in the Climate and Energy strategy of the municipality in 2017 (Fredensborg Kommune, 2017). They have done this by promoting energy efficiency, renewable energy and sustainable transportation in order to secure the green transition. The municipality have ambitions to:

- Live up to the Paris Agreement by limiting the global warming to 1,5 °C
- Contribute to reaching the regional goal of a fossil free electrical- and heating-sector in 2035
- Contribute to a fossil free transport sector in 2050
- Live up to the national goal of a 70 % reduction of the CO_2-emission in 2030

The municipality's efforts have focused on different sources of CO_2-emissions and all contributes to reaching the goal to reduce CO_2-emissions. The emissions in all of the municipality of Fredensborg have decreased 20 % from 2010 to 2015. The Municipality of Fredensborg (2020) One of the initiatives to meet the goals of 2020 is to offer citizens a free energy screening accomplished by Transition. Transition has throughout the years 2018, 2019 and 2020 performed over 400 energy screenings with citizens in the municipality of Fredensborg. The next step in the process is to follow up on the counselling.

1.4 Following up on Energy Screenings

Transition has over the past couple of years worked on the impact of following up on the counselling and screening process. They have through language analysis of energy advisers and the houseowners who sought guidance found 6 different personas to characterise the citizen's different motivations, barriers and life cycles. Their findings have been made possible through the Danish Energy Agency's counselling hotline SparEnergi.dk, where Transition have answered over 1000 phone calls and emails. The personas they are working with is:

- The Busy (Den Travle)
- The Economical (Den Sparsommelige)
- The Neat and Tidy (Den Ordenlige)
- The Cosmopolitan (Verdensmanden)
- The Handyman (Handymanden)
- The Competitive (Konkurrencemennesket)

The current practice of the follow up process has been done by an other intern called Christian, who is on his 3rd semester of being a civil engineer in indoor climate and energy. He is calling homeowners and asking if they completed the suggested projects from the energy report, which have been sent out to them after the initial screening of the house.

1.4.1 Initiating wonder:

Which challenges does houseowners meet related to an energy refurbishment process? I will during my research try to investigate how you can design and target the follow up process to the individual homes. With the point of departure being Transition's knowledge about personas from energy refurbishments and the practice of energy saving. How do houseowners decide to refurbish with a focus on energy efficiency and what challenges does the following process have? This problem have two inherent parts to analyse as I see it.

The first part being to study the citizens' relationship to energy refurbishment and the energy advisor. The next part being the energy advisers' own relation to the process and maybe the whole company's position in this. There is a distinction between the level of technology used in the two situations. One, where the technology is the product of an energy refurbishment, but another, where the technology is the service provided by the energy advisers and Transition. The problem statement will focus on the relation between the researcher and field and how to identify practice.

1.5 Problem Statement

How does Techno-Anthropological competencies bring value to the practice of following up on energy screenings in private homes

To work with the problem statement I have split it into three research questions:

- How is the practice of energy saving understood and researched?
- What is the Energy Anthropological framework of the company Transition?
- How could energy screenings of the future be followed up upon and facilitated?

1.5.1 Reading Guide

Chapter 1 and 2 introduces the background for the study. Here it introduces the need for holistic solutions to the building and refurbishment sector. Chapter 3 introduces the Theoretical Framework for this study with Practice Theory, the Techno-Anthropological competences and brief introduction to Living Labs. Next is chapter 4 where the methodology of Participant Observation will be presented and discussed in the context of an internship in a company. In chapter 5 the results of the field research will be analysed. And last but not least chapter 6 with the conclusion.

Chapter 2

The Problem

> *"You must unite behind the science. You must take action. You must do the impossible. Because giving up can never ever be an option." - Greta Thunberg, 17/09/19*

2.1 Energy Policy

To keep the increase in temperature below 2°C relative to pre-industrial levels, the world must cut CO_2 emissions drastically (IPCC, 2014). Globally, this started in 1992, at Earth summit where UN (United Nations) and WMO (The World Meteorological Organisation) sets up UNFCCC (United Nations Framework Convention on Climate Change) to provide an objective source of scientific information. Then in 1997 the Kyoto Protocol was adopted and countries included in Annex B agreed on the first commitment period and their emission targets. In 2007, Al Gore and IPCC was awarded the Nobel Peace Prize. The Fifth Assessment Report states the knowledge concerning the science of climate change in 2014 and in 2016, 175 world leaders sign the Paris Agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. Which leads us to 2018 where IPCC (Intergovernmental Panel on Climate Change) issues special report on the impact of global warming of 1,5 °C.

On a national level the Danish government made an energy agreement in 2018 to convert energy supplies to a greener energy system, which will be 100 % based on renewable energy by 2050. (Danish Government, 2018: p. 9-10) But since then, there have been a call for general election and a new Danish government with Mette Frederiksen as Prime Minister have been elected. The new Danish government wants to accelerate the transition to a more sustainable society and have a goal of reducing CO_2 emissions in 2030 by 70 % compared to the level in 1990. That is a increase from 32,5 % compared to the former government. (Danish Government, 2018) The climate action plan contains steps regarding

energy refurbishment with requirements to energy efficiency in public construction and a national strategy for sustainable construction.

Current strategy is based on information and subsidies. Homeowners are seen as "decision makers" by policymakers. There is a need for shifting focus to see decisions and actions as embedded in a practice of dwelling. The three options for energy refurbishment are municipality initiated, DIY projects (Do It Yourself) and building contractors.

2.2 Sustainable housing

Lecturer in building, architecture and indoor climate Andrea Mortensen have in her Ph.D. project studied barriers and motivational factors for energy refurbishments of Danish single-family houses. The results suggest that the biggest motivational factors for houseowners to make energy refurbishments are improved comfort and indoor climate, architectonic beautification and a healthy economy (Mortensen et al., 2015: p.152).

Within the existing literature about energy refurbishments and retrofits there is identified a series of different barriers, which range from lack of knowledge about the possibilities, lacking knowledge about the non-economical benefits, uncertainty about financing and lack of interest (Jensen, 2004). Oftentimes, comfort, aesthetics, indoor climate, the environment, economy, service and maintenance of the house are articulated as either motivational factors, elements in barriers or barriers as themselves (Mortensen et al., 2015) (Niras, 2013) (Mortensen et al., 2018).

The energy saving approaches regarding buildings can be divided into three factions; the architectural, the engineerical and the anthropological. Studies of consumer behaviour of household energy use are highly relevant, although research has generally favoured a focus on technical efficiency (Gram-Hanssen, 2010).

Economic and psychological approaches are based on human rational analysis. With technology included in the framework as a variation of more or less efficient applications. not only efficiency is important, but also the way technology is used, configured, and designed (Gram-Hanssen, 2010).

In a talk with a coworker named Nicolaj at Transition, who is a civil engineer specialised in energy and indoor climate, I asked if they used some of that modelling I was reading about in the scientific papers. He said, there is no funding or time to model and calculate every house, because it makes the screening expensive and therefore contradicts its purpose. Danish houses are pretty identical. Nicolaj estimates that there is approximate 10 different types of houses in Denmark. Economically challenged houseowners can only

manage short and manageable returns of investment. Whereas houseowners with a financial surplus only can see the trouble of investments with a small return.

Scientific papers, academic reports and methods are funded by politics and should be the incentive for initiatives and action plans. In the energy screenings the adviser searches for projects with downright return of investment. The wealthy part of society has a higher education can therefore understand information about energy refurbishment for example. Which means they do not need counselling in the same way.

2.3 Working in Transition

Transition's office in Aarhus is located on the top floor of the star-shaped building Navitas near the harbour front of Aarhus Port. Navitas is home to 2.700 students, teachers and researchers with the school of engineering, the school of mechanical engineering and Incuba as well as entrepreneurs and businesses. Incuba is as its name suggests an incubator for start-ups and small businesses. Incuba on Navitas specialises in start-ups with energy technology, but has other professional communities throughout Aarhus.

Figure 2.1: A drone shot of the building Navitas where Transition has its office

Navitas was completed in 2014 and was the first office for Transition. Their current office is about 50 m^2 and is all white. In the middle of the office there is a large customised height adjustable table with four office spaces. On the right hand side a rectangular desk is pointed at the wall separating the different offices in Incuba and this is where Line and

Rasmus sits. At last another long rectangular and white table is pointed at the window side of the office. This table has no division of space and is used by us student workers. At the desk there is a beautiful view of the bay of Aarhus and Molslinjen going back and forth from Jutland to Zealand like a pendulum.

The wall on the left hand side is fully covered with a whiteboard. The whiteboard has different calculations of buildings and information about Incuba and booking of meeting rooms. The last wall has frames of different articles about Transition and featuring some of Transitions different projects.

On several occasions I had a *walk'n'talk* with the CEO Rasmus where we talked about Transition. He describes the origin of Transition as a reaction to a problem. Before establishing Transition, Rasmus worked as salesman in a large energy consulting company and he could see that the way they treated project and customers was leading to doom and order to survive we need to reposition as he said. His vision of Transition came over night. The way to do energy counselling was radically different than what he came from. One fixed goal and no package deals. The structure of Transition is flat, which means no separate departments and no recording of hours. Every project is handled by a team which consist of different academic disciplines and only in these conditions can real innovation flourish. (Rasmus Jakobsen, from notebook entry: 4/9/20)

2.4 The Good Energy Counselling

The good energy counselling is proactive, it is based on the individual's situation and help the citizen to get along in their decision process.(Nørmark, 2020)

The role as adviser consists of asking supplementary questions and find out what the citizen knows, which considerations she previously has taken, and where the doubt is right now. From this you must identify where the citizen finds herself in the decision making process and what she needs for her to go to the next step (Nørmark, 2020).

Most studies concentrate on the houseowners and how to present them with energy savings. With a knowledge of the best practices that houseowners should adapt to. Houseowners only have knowledge of their own practice and former living conditions, whereas energy advisers have a complete picture of neighbourhoods and types of houses. When energy advisers are visiting houseowners, the suggestions to refurbishing are discussed and suggestions with no interest to the houseowner are discarded.

A persona is a description of a fictional character pieced together of knowledge about real people, who are used to get ideas to design of products or services. Descriptions of per-

sonas contributes to create a joint understanding of who the target group is (Nielsen, 2019: p.7-10). The aim is to create identification with the users, so it becomes possible to understand their world and create solutions targeted to them (Nielsen, 2019: p. 91-92). The persona does not exist as a certain individual, but composed of a series of real peoples everyday and needs. It is not unusual that a person we meet in our day to day life can contain traits from more than one of the described personas simultaneously. Most people would however fit more into one of the characteristics than the others.

The persona approach is first and foremost qualitative and collects knowledge about needs, opinions and behaviour through narratives about the informant's practice and life situation (Nielsen, 2019: 39-40).

Andrea Mortensen emphasises the importance to not see houseowners as one large homogeneous group. She separates houseowners into two groups, which represents two very different placings in a life cycle and two diverging motivational factors, when on the subject of refurbishment practice: the young houseowners and the elder houseowners. The young houseowners are according to Mortensen's research motivated by comfort, indoor climate, energy consumption and architectural appearance. The elder houseowners are harder to motivate, but it is possible through improvements in comfort. It is however important for them that the appearance of the house does not change significantly (Mortensen et al., 2015: p. 296).

Also anthropologist Lise Tjørring concerns herself with the life cycle and practices in private homes. In the business PhD project "Project Zero" she presents her experiences from one of her projects about energy refurbishment in private homes in the municipality of Sønderborg. She points out that timing is an essential point, because houseowners' notion about how long they will live in a house is depending on decisions about energy consumption, and whether you want to do refurbishments with long returns of investments. Radical changes in people's lives such as marrige, divorce, changed job position, children move out and long term illness can either increase or decrease the motivation to refurbish (Tjørring, 2016). Tjørring's life cycle perspective, where the house's life is intertwined with peoples' lives, is based on a Practice theory approach where the lived life in the homes are crucial.

This leads to an again very detailed explanation of the energy screening process. Background, statistics, participants, project goal, time horizon, agenda etc.

From here on we go to another thorough and detailed recap of the follow-up process, which is Transitions product to Fredensborg. Quotes. What is the purpose. What is the follow-up process? What is the challenge? What are the possibilities? Which actors are incorporated and is thought to play a role in it? Where are the tensions? The different working processes and the field which I have been in relation with.

I conclude the chapter with the rest of the report deals with my work with the energy screenings and especially the design process of the follow-up, which I will access and analyse as a Living Lab

Chapter 3

Theoretical Framework

3.1 Practice Theory

Motivational factors, barriers or values are not enough in themselves to explain why privat houseowners do energy refurbishments since the different everyday practices have significant impact on the way we consume energy in our daily lives. The Practice Theory is widely held as an approach to understand and study exactly this. See Shove et al. (2007), Gram-Hanssen (2010) and (Strengers, 2014).

Practice Theory contributes with a framework of understanding which widen the dominating presumption about values, motivations and barriers as conditional to the individual and decision processes in relation to energy refurbishments as limited, individual processes, where rational choices are made in the light of objective data.

A practice consists of both individual, social and material elements (Shove et al., 2012: p.23). If you wish to understand energy refurbishment, you therefore need to look at the relations to existing practices and study the different elements that are maintaining or creating changes. According to environment sociologist Nina Baron and scientist in interdisciplinary culture studies Håkon Fyhn energy refurbishments must be understood as connected to what they call "Practice of Dwelling": the practice which relates to creating and maintaining a home and also includes large or small initiatives in the house and the daily life. People develop and change over time, but so does materiality, the social life and the political landscape. Therefore, it is important to focus on the interaction between these and how each of them impacts the process of energy refurbishing. Things tear down and that is why they need to be replaced, laws and subsidies change and create new incentives.

The "Practice of Dwelling" approach is inspired by Tim Ingold's phenomenological world view that focuses on the individual's experiences on the basis of the surroundings which they themselves create through continuous involvement, "dwelling" (Ingold, 2000). The

"practice of" from Shove's standpoint in the Practice Theory, which is less based on the individual, but more on the basis of how practice is made and transformed cross larger social groups (Fyhn and Baron, 2017)

1. "Know-how and embodied habits
2. Institutionalised knowledge
3. Engagements and
4. Technologies." (Gram-Hanssen, 2010)

In order to conceptualise the Practice theory approach to energy refurbishments I heavily lean on the terminology introduced by Kirsten Gram-Hanssen in her paper about standby consumption. Gram-Hanssen compares the meaning and terms of Practice Theory used by (Reckwitz, 2003) and (Schatzki, 1996) who is the co-fathers of Practice theory as I will use it.

In an attempt to understand and visualise the dynamics of practices in energy refurbishment I turned to Shove's dynamics of having and doing. Her book, The Design of Everyday Life, describes the practice of refurbishing kitchens and identifies three generic features of the having and doing dynamic. I will in this section try to translate this dynamic to energy refurbishments in Fredensborg. First, many of the energy refurbishment suggestions are expected to engender certain social practices. Most of the people followed up upon wanted to save energy and all newly installed appliances are more energy efficient than the previous installation. The energy refurbishment foster and in some cases enforce desired habits like saving energy. More abstractly, product developments and design innovations have implications for what people expect in the first place and for how they then conceptualise what is ideal, normal and necessary (Shove et al., 2007: p. 34).

Second observation is that some people already have the products needed for an energy refurbishment, but is waiting for the right timing or different repertoires of doing. The typical example is boxes of insulation in the garage just laying about or something as simple as thinking about the consumption of energy. The persistent failure to live up to expectations and imagined futures is an important source to restlessness and an indication that technologies, alone and in combination, are incapable of generating new habits and conventions (Shove et al., 2007: p.35).

Finally, there was of course families where the present practice was very well aligned with their dreams of the future and they have a balance in their having and doing relation. In regards to the practice of energy refurbishments, mayor life events as moving out or sickness typically trumps any refurbishment practice. But it can also be the case that the house

simply does not need fixing or it is not financially worth one's while.

The figure below sketches the dynamics of having and doing with *A* representing the current practice and *B* the future practice.

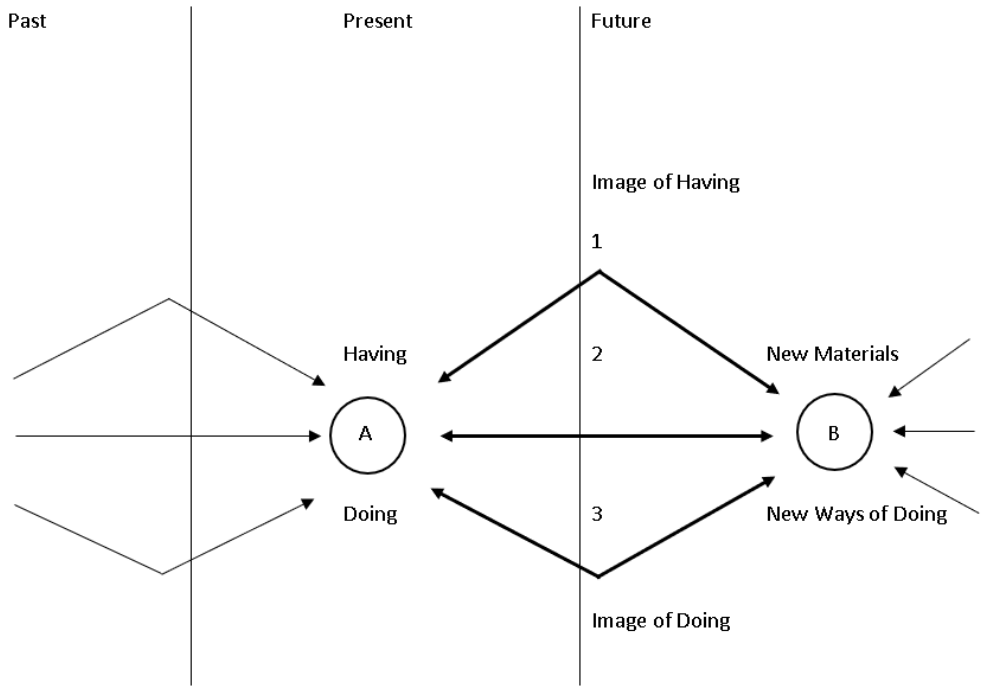

Figure 3.1: The dynamics of Having and Doing (Shove et al., 2007: p. 36)

The first route; in which achieving *B*, or realising the future image of doing demands obtaining new materials. This engenders having-oriented restlessness (Shove et al., 2007: p. 36).

The second route; in which *B* will simply transpire. In this case, *A* and *B* are more or less the same. And the third route; in which achieving *B* does not require to obtain any more materials, but involves making different use of what already exists. (Shove et al., 2007)

3.2 Techno-Anthropological Competencies

The Techno-Anthropological research domain and interest consists of many facets and different angles of approach. In the following section I will briefly unfold the Techno-Anthropological competencies.

Techno-anthropology is not based on one particular view on technology but encompasses different concepts of technology. However, the programme is generally informed and inspired by the analyses and conceptions of techno-science and technology, which have been

developed in the interdisciplinary fields of Science and Technology Studies and Philosophy of Technology among others. Techno-Anthropology concerns itself with every aspect of certain technological domain and its relations to other stakeholders. This requires a broad understanding of technology where technology for example consists not just of technical matter, but of entangled socio-technical matters. The understanding of a technological process does not reach a final form after research and development, but where technologies are endlessly developed, changed and modified. The product, artefact or technology has no original nor final form.

The Techno-Anthropological competencies are found between the users, experts and products of technology in figure 3.2.

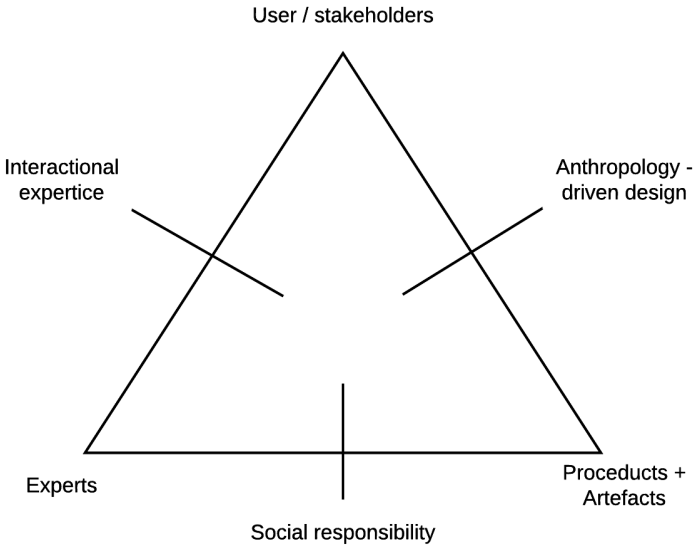

Figure 3.2: The Techno-Anthropological field (Børsen and Botin, 2013: p. 49)

Between the expert and user interface is the competence, *interactional expertise* that can repair a lack of understanding between technological experts and users of technology. But also be a mediator between different expert cultures: the humanities and the sciences (Børsen and Botin, 2013: p. 49).

Between the user and artefact interface is the competence, *anthropology-driven design* where the Techno-Anthropologist is design oriented and actively take part in the bridging of opposing perspectives. This means Techno-Anthropology transcends classical anthropology for what concerns both the affiliations and the aim of provoking change through action-oriented research (Børsen and Botin, 2013: p. 50).

Lastly, between the expert and artefact interface is the competence, *social responsibility* that is about ethically sensitising expert cultures that develop new technologies. This is needed so that they are able to make informed, robust and commenting ethical judgements about their own and other experts' scientific and technological productions (Børsen and Botin, 2013: p. 49-50).

3.3 Living Lab principles

A living lab is about meeting users and problems where they take place; In the everyday life, in the mess of refurbishing and in the unpolished and uncensored opinions and actions. (Kirstine Adriansen et al., 2014)

A new idea, a sketch to a concept, or a new product needs to be tested quickly in the real world and be in touch with its future users – sceptics as well as optimists. The sceptics are experts in finding flaws and deficiencies and thus their contribution makes up a crucial input for developers and represents a criticism that can be expected to meet the solution when it is publicly available.

In a living lab it is a virtue to track down flaws and mistakes. It triggers a pivotal possibility to learn and eradicate weaknesses early and save product developers both time and money related to late stage corrections and reprioritisation (Era and Landoni, 2014).

In my past student project, I worked along side other Techno-Anthropological students to develop five principles to contextualise the Living Lab approach in the municipality of Frederikshavn in North Jutland (Bager Jakobsen, 2019). The principles are as follows:

1. Co-operation and partnership
2. User involvement
3. Test, Fail and Learn
4. Authenticity
5. Acknowledging the competent user

The living lab principles from Frederikshavn will be the departure for analysing the energy screenings in the municipality of Fredensborg as a living lab too and maybe implementing them in the way Transition work with municipalities in the future.

In the text: *"The Problem of Action: Infrastructure, planning and the informational environment"* from 2016 Hannah Knox argues that to experiment can be a way to handle challenges as the pressing climate change by converting good intentions and plans to action.

The essence of experiments is exactly that they in a certain sense sets practice and action before planning. But, says Knox, even though this can be a way forward to overcome barriers between planning and practice, then we still need to be critical of the output from experiments, including how they are designed and used in practice. She refers among others to anthropologist Tim Ingold, who through many years have researched and criticised western understanding of design which puts the plan before action.

In his critique of the plan, Ingold demonstrates how people do not somehow create an image of the world in advance of their action within it, but produce understandings of the world through situated, embodied engagement with the environment that surrounds them (Knox, 2016: p. 354)).

Chapter 4

Research design

The methodological approach in this thesis is a hybrid form of Techno-Anthropological research and internship. A hybridisation created between a student who courts to a potential employer and a student in an academic program doing research. Trying to find a balance between being available and collaborative meanwhile, collecting empirical data and immersing one self in the literature.

4.1 Participatory Observation

Participant observations have been the approach used for collecting part of the data. In participant observations, one seeks the presence in the moments of activities in order to use the body and senses to explore and feel the practices that one participant in (Tjørnhøj-Thomsen and Whyte, 2007) and (Spradley, 1980). The participant observations have different levels of activities, going from the non-participant to the complete participant, where the level of activities gives you a deep insight and feeling because you have it in your own hands (Spradley, 1980).

The formal role as an intern with special tasks presents itself with possibilities and challenges in relation to a more or less ethnographic fieldwork. The role of an intern implicates from participant observation to observant participation. (Gatt and Ingold, 2013: p. 154)

The rest of the data was collected through the phone calls of the citizens and interviews with coworkers. This was made possible with recording software to my mobile phone, but as of beginning of June an Android update made it impossible for mobiles to record calls definitely. Which I was not aware of at the time. The repercussions of this issue will be discussed in the overview of data below.

4.2 The Everyday

The following section is a part of my observations during a field trip to Fredensborg participating in four energy screenings together with Line:

Before our first visit, I get to ask Line some questions about today's plans. There are 5 scheduled energy screenings in the Municipality of Fredensborg today, but the first one had to cancel because of sickness. I ask what to expect at a screening and if she has prepared some suggestions based on the information given beforehand. Line explains that every screening is different, and you cannot really prepare for every individual visit. A small house could be expected as "easy", but when she gets inside and talk with the owners a lot of projects needs to be discussed. The opposite could happen with a big house, but all projects are finished and there are no more initiatives to save money or energy.

After the break because of the cancelled screening, we continue to the next house on the list. Line had been in contact with the owner of the house because they had just started refurbishing and wanted to know if it was still relevant. They agreed to do the screening and we drove into the driveway of a single floor house from 1968. The driveway was filled with building materials and old appliances. (Notebook entry, 8/9/20)

4.3 Empirical data

As intern on Transition I had a list of different field activities:

1. Follow up calls
2. Follow up interviews
3. Interviews
4. Ethnographic meetings
5. Observations about following up and other projects

Gathering and sorting empirical data from these different activities were done in my little black book and on my computer. Making sure to mark the different information and were it came from. I also used experience from my previous semester projects especially my 9th semester at Energy City Frederikshavn, where I was in a similar position.

In the follow-up process I use experience from gathering informants in former projects. Sending text messages, recording messages on answer phone, calling different days and on different times of the day. If I got them in a bad time, I made sure to schedule a new

time for me to call them. To make sure the houseowners are encouraged and incited to implement the proposed refurbishments in their houses. I performed right about 400 phone calls to different citizens in Fredensborg and got through to 350 of them. The citizens have had a visit from one of the energy advisers from Transition in 2018, 2019 or 2020. In appendix B there is a complete list of all the citizens I have had contact with. The order of the citizens is the date when they received their energy screening report. Only 19 of these follow up calls where recorded because of the software update on my Android mobile, but luckily Transition had prior to my research interviewed other houseowners in relation to their Energy-Anthropological framework, which I then gained access to. In appendix C there is a complete overview of all the interviews I had with informants and dates of their recording.

Two following up interviews was carried out as well as two interviews with the energy advisers of Transition to answer my last questions. I arranged two meetings with partner and civil engineer Line Nørmark to ask about Transition and the Energy Screening process. In the open office area I asked Line, Andreas and Rasmus several questions and went on four *walk'n'talks* with Rasmus to discuss my Thesis and the job I was doing.

Chapter 5

Analysis

The following chapter will analyse data including discussions of methodological and theoretical terms and literature.

I will regard and analyse the home energy audits done in the Municipality of Fredensborg as a Living Lab, where I contribute to "rub" this insight into Fredensborg and Transition because of several reasons, which I will then analyse on in this thesis. The Living Lab approach is arrived at based on my experience with the method during an internship in the municipality of Frederikshavn. The cases for the municipality of Fredensborg and Frederikshavn are very similar. Both municipalities have high ambitions regarding their green initiatives and have focus on lowering the carbon emissions from private homes.

I investigate and analyse which overall elements from Transition's anthropological approach that is incorporated in the energy audits in the Municipality of Fredensborg. Transition's user-centred energy counselling.

Transition and the municipality of Fredensborg sees the Follow-up as a finished product. Especially because Transition is economical dependent on the percentage of citizens which implement the suggested energy refurbishments. The product Fredensborg is paying for is set number of implemented energy refurbishments and saved CO_2 emissions calculated from kWh.

By reading up on Living Labs literature and discuss it up against the experiences and empirical data from the internship I can contribute with understanding the Follow-up process not as the finished product, but rather an experiment for Fredensborg and the moment where the laboratory becomes a living and breathing thing. Because, the impact of the energy counselling only hits if there is an implementation and only then can all the other heterogenous actors (craftsmen, banks, energy advisors, homeowners and so on) meet, whereas the potential for co-creation and not at least learning about each other's needs and perspectives can arise. In this light, the evaluating work with contacting and research-

ing the homeowners is in practice if anything an even more important task for Fredensborg.

5.1 Followed up

When I first heard about the task of following up on energy screenings, I must admit that I was a little sceptical of how much work that could take. But I was quickly convinced otherwise! At first, it can seem as a tiny and tedious job with little impact, although this little task has really grown big and ambitious over time.

The first thing you find out is to be very accommodating towards the citizens. Not sounding like you want to sell them anything. The follow up is collecting answers and opinions. Every call is reflected upon and the experience is brought along to the next call and next citizen.

After I finished up the follow-up in Fredensborg I could feel a little powerless against the *no's* to energy refurbishment. Because it feels like they already decided not to do anything. They use words like: "Det passer ikke lige (It isn't convenient right now)", sickness and "Det kan ikke betale sig (It is virtually unaffordable)" . I can not be in control of other peoples lives and homes. It is a little frustrating for me, but also for the houseowners to know something can be done. However, these houseowners doesn't have sufficient time, resources or "energy" to do something about it.

5.2 Barriers and personas

Not enough time in a busy workday to learn a new system and to invest a lot of money on it.

Not enough money to upgrade the heating source. Has a well functioning oil-fired boiler and it is not a priority to switch it out.

Distrust in craftsmen or installation contractors to make them a impartial evaluation of what is best for the house and family.

Big investments which will not benefit the houseowners in their lifespan, either because they thought of moving away or because they are retired from the working force.

To switch heating source is a big project for many, whether they can do it themselves or they pay a craftsman to do it. It takes a long time to plan and it can be delayed by many reasons. For example, if you can not invite any offers, if illness strikes in the family or even in the company hired to do the work.

Topics that are not visible in the citizens day to day life for example high energy consumption is extra important to follow op on. Since non-visible topics have a tendency to be forgotten, until the next time the power bill needs to be payed.

If the citizen does not act upon his or hers issue, maybe it can be a good idea to give them alternative suggested solutions. Even if it is not the best possible solution. The second best solution is better than no solution.

Even though the citizen is well into the process, then the follow up advice can still be useful and ease the process by for example helping the citizen navigating in new knowledge, new information through a talk with the contractor or invited offers.

Simple reminders with e-mail or sms can be useful early on in the citizen's process, but the closer the citizen is to implementing a project, the deeper technical insight needs the adviser. Since the questions can become more technological specific.

Written information sent by e-mail after an advisory conversation can be an important factor whether the citizen comes along with their process. Since they have time to read the information in peace and does not forget important steps.

The persona "The neat and tidy citizen" has time to talk and they calm down when an adviser takes his time. The thorough conversation can open op for new projects. It is a good idea to bring up the advantages in terms of comfort, but remember that the tidy citizen is not the kind of person who spends widely.

The persona "the busy citizen" does not have time for unnecessary talk. The adviser must be quick to get to the point and be good to ask about relevant and specific elements.

The persona "the economical citizen" can have a lot of questions throughout their own DIY projects. A technical strong adviser can help to expand, ease or quality assure the projects on the way and the type would be open for new possibilities.

The personas bear witness of seasons for refurbishments in the citizen's life cycle where the timing would be extra beneficial for a adviser. These are: Young people, who just bought a house. Families with young children, when they just come out from the other side of the worse busyness with small children, because the children have grown up. Elder citizens, who have the time to talk with a adviser and consider new projects.

Observation of to personas in one home. The woman I talked with was the "Neat and tidy" person , meanwhile her husband was a handyman. There occurred a little conflict regarding how fast projects in the household should be accomplished.

5.3 Transition

The first tasks as an intern in Transition was successful and it was a educational experience. I produced the background research information to Rasmus, the CEO about holiday housing. A little side track from my Master Thesis, but relevant to the work in Transition and insightful to get to know the company structure and culture. The company is split into two. An Aarhus department and a Copenhagen department. In Aarhus they have the engineers, energy advisers and interns. In Copenhagen they have anthropologists and energy advisers. I am seen as a link between the departments and represents the anthropological approach in Aarhus.

The two energy advisers Andreas and Andreas learned more through experience, practice and training. They have a lot of the knowledge they need from their engineering studies and as they encounter new questions they just find the answers in different reference works. The positioning of Transition: Working as consultants for municipality and advise citizens in single family homes. Consultants act retroactive, advisers act proactively.

5.4 Redesigning the Data Sheet

Ordering of data must be reconsidered in the data sheet (see Appendix A). The current content in the frozen cells on top is calculations and statistics for accounting, but since I am working in the sheet with the follow up task I feel like the space could be used better. Instead I need the personas and decision phases with corresponding suggestions to a follow up strategy listed above.

Meanwhile, I am following up on Energy screenings I suddenly discover new modifications to the Data Sheet itself. The modifications will make following up more clear and simple to execute. Even for someone who hasn't done it before or have any knowledge about Energy screenings. It must be easy for the adviser to insert numbers and calculations, but also clear for the follow-up'er.

Advisers can while doing the screenings give a qualified estimate to the persona living in the household and the follow-up strategy can be implemented. I see it as a way of quantifying qualitative procedures. The data sheet translates binary answers to personas and follow-up-strategy.

The effort of producing things can be hidden in an effect called *throwaway consumer society*. In relation to the heating unit of a house, people have often a strong connection to the way they heat up and consume energy. They find it hard to see beyond their local system and the impact it can have. Focusing on their own comfort and global trends instead of what

they can do. It is often a big investment and they would rather wait for the current heating unit to collapse or break before buying a new one. A certain group have had problems and as soon they are introduced to a better system they will convert to the heating pump (Fabricio et al., 2018).

5.5 Living Lab

Combining the knowledge about Living Labs and Personas leads to six suggestions for experiments in the municipality of Fredensborg.

The Busy citizen must be shown the way if there needs to be implemented something other than an urgent repair. That is why a simple package deal combined with follow up counselling is the optimal solution for them. The targeted communication must be aggressive, meant in the way that many notifications is necessary, but the message should be simple, so it does not take up too much time.

Developing DIY videos with the most common and easy to start projects will help the Economical citizen, because it is easier to watch as something is made or fixed rather than reading about it.

It would be beneficial to facilitate events, where the Neat and Tidy citizen can watch and experience new products, so they can feel comfortable by the new solutions and technologies. The good source of inspiration from like-minded would also be effective at creating comfort with a new solution.

The Cosmopolitan will be attracted to events with the headline *"Environmental efforts"* or local initiatives about sharing economics.

Developing a platform with exchange of experiences of the more nerdy or technical nature would appeal to the Handyman.

The Competitive would benefit by attending events where an energy adviser is completely updated with the newest trends and standards for zero-energy houses for example or the latest knowledge about batteries to storing energy.

Chapter 6

Conclusion

As a contribution to Transition and the municipality of Fredensborg I try to design a process, which have the purpose to address how they in the future can work with the follow-up process of energy screenings as an experiment and not at least evaluate the activities which I have helped start.

Fredensborg can, with the help of my project, get an understanding of that it is probably not the first time, where they hit the mark by creating the right counselling for private energy refurbishment. By learning of the insights which the evaluated work with energy screenings and follow-up give rise to, there is a good possibility they will be able to it in the future. This can be the argument of the project.

Transition is a modern Energy Consultancy firm, which attempts to break with the traditional technology centred counselling in the Construction and Energy field. The tasks as a professional Techno-Anthropologist in a company like this consist of

- Being in contact with people. Making real life connections.
- Bringing forth the insights from interviews, encounters and the field.
- Making practices and processes more efficient. Streamlining on the basis of an unfolding of current situations.

I perceived the challenges in the follow-up task as technical and organisational, but maybe ignored the human factor. The feedback from talking with colleagues emphasised on my people skills and they assign the human factor as much if not more than the organisational part of following up. The reason for me not being aware of the human factor highlights the interdisciplinary skills of a Techno-Anthropologist. It was not because I left it out or forgot about it, but I was taking it for granted. In former projects as students we focus on the intersection between technology and humans, but in a new technical setting I focused on learning how the systems worked. Sustainability policies have increasingly been reduced

to general energy and climate policies narrowly focusing on large-scale utilities in the energy sector. Excessive regulation or mutually counteracting policy tools and technologies addressing household level seem to result in, for example, increased energy consumption, even when the opposite was intended. Many policies based on monetary incentives such as tax reductions, subsidy and so on do not take into account the daily practices of households and therefore result in unintended consequences. Consequently, a major challenge in approaching the goal of sustainable housing and communities is to reach out to individual households in order to encourage and stimulate profound changes in households' consumption of not just energy but also other resources. (Norvig Larsen et al., 2016: p. 108)

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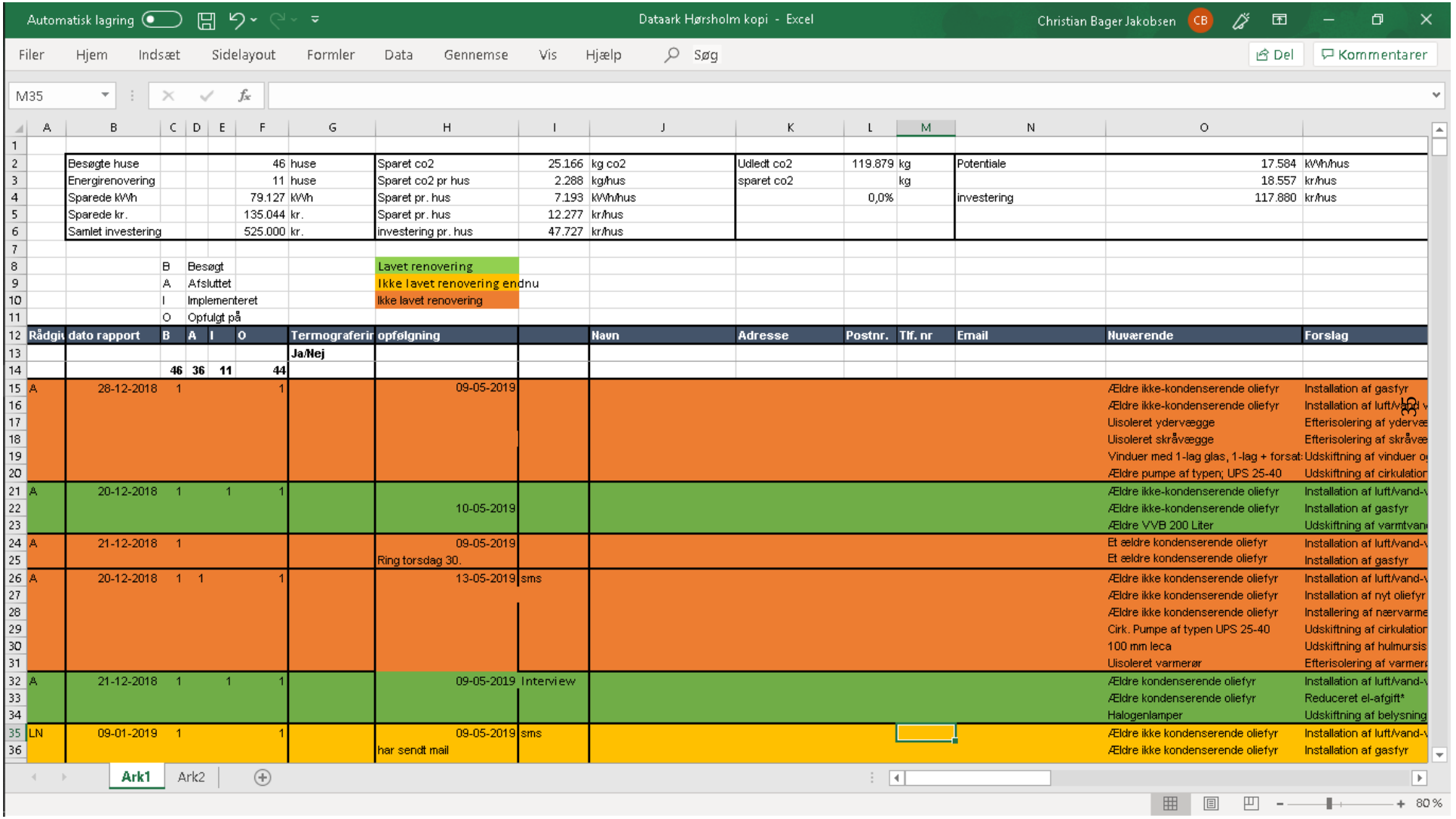
Appendix A

Data sheet

This is a screenshot of the Data sheet used while following up on energy screenings. The information about the citizens have been removed and the Excel document is both used be the person following up and the energy advisers creating a report to send to the citizen and inserting the data into the sheet.



Automatisk lagring — Dataark Hørsholm kopi - Excel — Christian Bager Jakobsen

Filer Hjem Indsæt Sidelayout Formler Data Gennemse Vis Hjælp Søg Del Kommentarer

M35

1																		
2		Besøgte huse				46	huse	Sparet co2	25.166	kg co2	Udledt co2	119.879	kg	Potentiale		17.584	kWh/hus	
3		Energirenovering				11	huse	Sparet co2 pr hus	2.288	kg/hus	sparet co2		kg			18.557	kr/hus	
4		Sparede kWh				79.127	kWh	Sparet pr. hus	7.193	kWh/hus		0,0%		investering		117.880	kr/hus	
5		Sparede kr.				135.044	kr.	Sparet pr. hus	12.277	kr/hus								
6		Samlet investering				525.000	kr.	investering pr. hus	47.727	kr/hus								
7																		
8			B	Besøgt				Lavet renovering										
9			A	Afsluttet				Ikke lavet renovering endnu										
10			I	Implementeret				Ikke lavet renovering										
11			O	Opfulgt på														
12	Rådgiv	dato rapport	B	A	I	O	Termografering	opfølgning		Navn	Adresse	Postnr.	Tlf. nr	Email		Nuværende	Forslag	
13							Ja/Nej											
14			46	36	11	44												
15	A	28-12-2018	1			1		09-05-2019								Ældre ikke-kondenserende oliefyr	Installation af gasfyr	
16																Ældre ikke-kondenserende oliefyr	Installation af luft/vand v	
17																Uisoleret ydervægge	Efterisolering af ydervæ	
18																Uisoleret skråvægge	Efterisolering af skråvæ	
19																Vinduer med 1-lag glas, 1-lag + forsat	Udskiftning af vinduer o	
20																Ældre pumpe af typen; UPS 25-40	Udskiftning af cirkulation	
21	A	20-12-2018	1		1	1										Ældre ikke-kondenserende oliefyr	Installation af luft/vand-v	
22								10-05-2019								Ældre ikke-kondenserende oliefyr	Installation af gasfyr	
23																Ældre VVB 200 Liter	Udskiftning af varmtvan	
24	A	21-12-2018	1					09-05-2019								Et ældre kondenserende oliefyr	Installation af luft/vand-v	
25								Ring torsdag 30.								Et ældre kondenserende oliefyr	Installation af gasfyr	
26	A	20-12-2018	1	1		1		13-05-2019	sms							Ældre ikke kondenserende oliefyr	Installation af luft/vand-v	
27																Ældre ikke kondenserende oliefyr	Installation af nyt oliefyr	
28																Ældre ikke kondenserende oliefyr	Installering af nærvarme	
29																Cirk. Pumpe af typen UPS 25-40	Udskiftning af cirkulation	
30																100 mm leca	Udskiftning af hulmursis	
31																Uisoleret varmerør	Efterisolering af varmer	
32	A	21-12-2018	1		1	1		09-05-2019	Interview							Ældre kondenserende oliefyr	Installation af luft/vand-v	
33																Ældre kondenserende oliefyr	Reduceret el-afgift*	
34																Halogenlamper	Udskiftning af belysning	
35	LN	09-01-2019	1			1		09-05-2019	sms							Ældre ikke kondenserende oliefyr	Installation af luft/vand-v	
36								har sendt mail								Ældre ikke kondenserende oliefyr	Installation af gasfyr	

Ark1 Ark2

80 %

Appendix B

Follow up data overview

This is a list of all the citizens responding to me following up upon their energy screening. The order of the citizens is the date of which they received their energy report.

2018		2019		2020	
16-08-2019	Nich	04-07-2020	Alexander	02-03-2020	Jørn
01-05-2019	Elke	29-03-2019	Emil	03-03-2020	Tom
04-06-2019	Mads	03-07-2020	Kristian	23-03-2020	Bente
03-04-2019	Ole	01-04-2020	Michael	23-03-2020	Thomas
01-05-2019	Wendy	24-07-2020	Karen	23-03-2020	Elvira
11-06-2019	Jan	23-07-2020	Poul	22-07-2020	Lars
03-04-2019	Svend	29-03-2020	Kirsten	23-06-2020	Hans-Henrik
28-05-2019	Steen	04-09-2019	Peter	23-06-2020	Helen
04-06-2019	Hanne	23-07-2019	Inge	23-06-2020	Steen
04-06-2019	Niels	23-07-2019	Vivi	23-06-2020	Peter
28-05-2019	Inge	28-08-2019	Anders	15-09-2020	Thomas
29-05-2019	Frits	28-08-2019	Christina	23-06-2020	Erik
01-05-2019	Carsten	04-09-2019	Claus	22-07-2020	Henning
04-06-2019	Jens	25-05-2020	Janny	23-06-2020	Henrik
28-05-2019	Connie	03-09-2019	Brian	23-06-2020	Sven-August
28-05-2019	Viggo	17-09-2019	Ellen	23-06-2020	Connie
01-05-2019	Egon	03-10-2019	Rose	27-11-2020	Jakob
15-08-2019	Lennert	28-08-2019	Ole	12-08-2020	Per
21-08-2019	Hanne	02-03-2020	Trine	23-06-2020	Eun
01-05-2019	Ole	17-09-2019	Angelica	23-06-2020	Trine
28-05-2019	Peter	04-09-2019	Ewa	23-06-2020	Marianne
28-05-2019	Frank	28-08-2019	Jørgen	25-08-2020	Nikolay
21-08-2019	Søren	04-09-2019	Anne	23-06-2020	Ane
21-08-2019	Cæcilia	17-09-2019	Allan	23-06-2020	Jane
28-05-2019	Suzanne	24-07-2020	Cathrine	23-06-2020	Palle
28-05-2019	Ib	24-07-2020	Jette	23-06-2020	Birgit
15-08-2019	Jørgen	28-8-2019	Murat	18-09-2020	Poul
15-08-2019	Flemming	28-08-2019	Peter	03-12-2020	Henrik
28-05-2019	Alex	28-08-2019	Anne	15-09-2020	Peter
28-05-2019	Mara	03-02-2020	Mona	25-11-2020	Karina
28-05-2019	John	28-08-2019	Carsten	25-03-2020	Jesper
28-05-2019	Karen	21-01-2020	Marianne	23-03-2020	Minna
28-05-2019	Torben	06-04-2020	Gavin	23-03-2020	Birte
13-06-2019	Søren	03-10-2019	Jens	23-03-2020	Lone
01-05-2019	Claus	23-07-2020	Else	15-09-2020	Christian

13-06-2019	Peter	23-06-2020	Sophie	15-09-2020	Ivar
15-08-2019	Anna	21-01-2020	Michael	15-09-2020	Karsten
28-05-2019	Henrik	01-02-2020	Alessandra	25-11-2020	Niels-Jørgen
28-05-2019	Jørgen	03-02-2020	Lone	15-09-2020	Helge
28-05-2019	Flemming	01-02-2020	Henrik	15-09-2020	Vibeke
28-05-2019	Kirsten	02-03-2020	Jens	15-09-2020	Morten
01-05-2019	Leif	01-02-2020	Henrik	15-09-2020	Anders
28-05-2019	Alf	06-04-2020	Benny	18-09-2020	Annette
28-05-2019	Ole	01-02-2020	Helle	18-09-2020	Margit
01-05-2019	Allan	06-04-2020	Steffen	18-09-2020	Mogens
16-08-2019	Mati	03-02-2020	Jean	18-09-2020	Bo
11-06-2019	Jesper	25-03-2020	Lene	18-09-2020	Birte
15-08-2019	Finn	23-06-2020	Flemming	29-10-2020	Kristian
11-06-2019	Morten	25-03-2020	Elsebeth	18-09-2020	Sam
15-08-2019	Anders	15-02-2020	Sophus	29-10-2020	Ingelise
28-05-2019	Ole	15-02-2020	Carina	29-10-2020	Sabine
22-01-2020	Inger	03-02-2020	Sarou	29-10-2020	Jannit
28-05-2019	Lene	15-02-2020	Annelise	29-10-2020	Jan
06-12-2019	Karin	23-03-2020	Palle	29-10-2020	Carina
06-12-2019	Søren	23-03-2020	Michael	27-11-2020	Niels
28-05-2019	Nicholas	15-02-2020	Leni	30-11-2020	Lise
28-05-2019	Camilla	13-02-2020	Torben	29-10-2020	Gry
28-05-2019	Nathali	13-03-2020	John	05-11-2020	Hanne
01-05-2019	Marianne	22-07-2020	Ulla	29-10-2020	Jesper
06-12-2019	Henrik	23-03-2020	Christian	05-11-2020	Vivi
28-05-2019	Gitte	23-03-2020	Rene	05-11-2020	Bjarne
06-12-2019	Christian	13-03-2020	Mogens	23-07-2020	Jørgen
06-12-2019	Charlotte	14-03-2020	Ausra	05-11-2020	Maj-britt
01-05-2019	Jan	23-03-2020	Jakob	27-11-2020	Birger
28-05-2019	Dean	23-03-2020	Allan	03-12-2020	Per
06-12-2019	Lisbeth	23-07-2020	Poul	05-11-2020	Pia
01-05-2019	Marianne	13-03-2020	Steen	04-12-2020	Anne
01-05-2019	Marianne	23-03-2020	Birgit	05-11-2020	Niels
06-12-2019	Claus	13-03-2020	Jens	05-11-2020	Hanne
01-05-2019	Rud	15-03-2020	Jim	05-11-2020	Anker
19-04-2019	Svend	15-03-2020	Peter	03-12-2020	Christian
19-04-2019	Ole	15-03-2020	Birgit	25-11-2020	Mogens

18-06-2019	Charlotte
11-06-2019	Morten
19-04-2019	Søren Bek
28-05-2019	Ulla
28-05-2019	Pernille
19-04-2019	Merete
11-06-2019	Luis
19-04-2019	Benny
19-04-2019	Salwa
22-04-2019	Janne
19-04-2019	Pia
11-06-2019	Ursula
28-05-2019	Erik
19-04-2019	Birgit
22-04-2019	Hans
19-04-2019	Lene
22-04-2019	Jørgen
11/06-2019	Inger
19-04-2019	Torben
19-04-2019	Sille
29-05-2019	Anders
13-06-2019	Finn
19-04-2019	Niels-Henrik
20-09-2019	Palle
29-05-2019	Jakob
19-01-2019	Niels
29-05-2019	Hannelore
19-04-2019	Lone
19-04-2019	Jytte
29-05-2019	Steen
19-04-2019	Ole
29-05-2019	Mette
29-05-2019	Nina
19-04-2019	Signe
22-04-2019	John
19-04-2019	Niklas
22-04-2019	Helle

15-03-2020	Erik
15-03-2020	Søren
15-03-2020	Gorm
15-03-2020	Jørgen
15-03-2020	Hans Christian
15-03-2020	Peter
25-03-2020	Steen
25-03-2020	John

27-11-2020	Trine
25-11-2020	Peter
25-11-2020	Mads
25-11-2020	Kenneth
25-11-2020	Hanne
25-11-2020	Benita
25-11-2020	Michael
25-11-2020	Jan
25-11-2020	Mogens
25-11-2020	Ulrik
25-11-2020	Tine
04-12-2020	Eivind
25-11-2020	Kari
27-11-2020	Jørn
25-11-2020	Tom
25-11-2020	Bente
25-11-2020	Thomas
25-11-2020	Elvira
25-11-2020	Lars
27-11-2020	Hans-Henrik
27-11-2020	Helen
04-12-2020	Steen
27-11-2020	Peter
03-12-2020	Thomas
27-11-2020	Erik
04-12-2020	Henning
03-12-2020	Henrik
03-12-2020	Sven-August
03-12-2020	Connie
04-12-2020	Jakob
03-12-2020	Per
04-12-2020	Eun
03-12-2020	Trine
03-12-2020	Marianne
03-12-2020	Nikolay

19-04-2019	Søren
19-04-2019	Claus
14-12-2019	Dorit
14-12-2019	Carsten
29-05-2019	Lotte
14-12-2019	Malene
29-05-2019	Anna Maria
19-04-2019	Jens
29-03-2020	Jørn
29-03-2020	Jens
22-04-2019	Dagny
11-06-2019	Søren
29-03-2020	Nanett
19-04-2019	Saman
29-03-2020	Bales
29-03-2020	Jesper
24-06-2019	Betina
19-04-2019	Thomas
22-04-2019	Niels
19-04-2019	Jan
29-03-2020	Jesper
29-03-2020	Poul
11-06-2019	Karsten
05-06-2019	Stefan
13-06-2019	Bjarne
19-04-2019	Maria
22-05-2019	Carsten
14-12-2019	Pernille
19-04-2019	Thomas
29-03-2020	Arne
19-04-2019	Tabita
19-04-2019	Bo
19-04-2019	Christian
14-12-2019	Lisbeth
14-12-2019	Pernille
14-12-2019	Uffe
14-12-2019	Joachim

11-06-2019	Finn
29-03-2020	Max
19-04-2019	Anne
21-04-2019	Edith
21-04-2019	Søren
21-04-2019	Mikkel
15-12-2019	Rune
29-03-2020	Kurt
21-04-2019	Ole
21-04-2019	Ole
21-04-2019	Julie
29-03-2020	Anil
05-06-2019	Svend
29-03-2020	Hans
28-08-2019	Peter
28-08-2019	Jim
28-08-2019	Henrik

Appendix C

Interview data overview

This is a list of the informants being interview through out the period of me writing my thesis and their occupation.

Data overview		
Date	Information	Occupation
01-05-19	Interview with Christian	Engineering student
09-05-19	Phone interview with Ida	Citizen
09-05-19	Phone interview with Lasse	Citizen
09-05-19	Phone interview with Arne	Citizen
09-05-19	Phone interview with Christian	Citizen
09-05-19	Phone interview with Per	Citizen
09-05-19	Phone interview with Ole	Economist
09-05-19	Phone interview with Jørgen	Doctor
10-05-19	Phone interview with Poul	Citizen
10-05-19	Phone interview with Ib	Engineer
10-05-19	Phone interview with Henning	Citizen
10-05-19	Phone interview with Asta	Citizen
10-05-19	Phone interview with Chresten and Else	Citizens
10-05-19	Phone interview with Dennis	Citizen
13-05-19	Phone interview with Jens	Retired doctor
13-05-19	Phone interview with Andreas	Citizen
13-05-19	Phone interview with Bente	Citizen
13-05-19	Phone interview with Jens	Architect
13-05-19	Phone interview with Jakob	Citizen
14-05-19	Phone interview with Ole	Citizen
27-05-19	Interview with Andreas and Andreas	Engineering students
29-05-19	Interview with Line	Civil engineer and Partner
19-06-19	Interview with Arne	Citizen
19-06-19	Interview with Jørgen	Citizen
24-11-20	Interview with Line	Civil engineer and Partner

Table C.1: List of citizens and employees interviewed

Appendix D

Interview guide in Danish

This is the semi-structured interview guide used in the different interviews.

Spørgsmål til opfølgende samtale med borgere der har modtaget energirapport og implementeret eller i gang med at implementere nye løsninger:

Nuværende situation:

Hvem er beboerne? Alder, livsfaser, karakteristika, interesser, livsstil

Hvilken bolig bor de i? Alder, karakteristika, stil

Hvem gør praktiske gøremål?

Erfaring:

Hvordan fik i idéen til at renovere?

Hvem fik den?

Hvad fik jer til faktisk at gå videre med idéen

Hvem planlægger det og hvem udfører det?

Fremtiden:

Hvilke ønsker eller drømme har i for jeres hjem? Er de forskellige fra din partners?

Teknologi:

Hvad får dig til at handle nu? Eller ikke at handle?

Tror du der vil komme nyere og bedre løsninger på markedet?

Energirådgivning:

Forstår i hvad der bliver målt, vejet og vurderet?

Føler i jeres stemme bliver hørt i rådgivningen?

Bliver der snakket over hovedet på jer?

Spørgsmål til Energirådgivere:

Fokusgruppe: Andreas Landsfeldt og Andreas Bøgh

Interview: Line Nørmark

Baggrund:

Fortæl kort om jer selv og jeres opgave i Transition

Hvor gamle er i?

Hvad er jeres uddannelse og hvilken retning har i?

(Hvordan hørte i om Transition?)

(Hvorfor valgte i Transition?)

Transition:

Har i tidligere arbejdet med Energirådgivning?

(Hvordan er i blevet trænet i rådgivning, hvis i er?)

Er Transtions måde at tilgå rådgivning anderledes end: Hvad i regnede med eller hvad i kendte til?

Kan i beskrive en typisk energirådgivning i et hjem?

Rådgivningen:

Hvad er det første i ligger mærke til på et hus? Har i en liste med prioriteringer eller er det individuelt

Hvor mange energiscreeninger har i foretaget?

Hvor lang tid bruger i pr. hus? Og hvordan er fordelingen af tid (screening, rapport, kontakt)?

Hvad er det vigtigste i denne fordeling? Hvordan bliver det prioriteret?

(Hvordan skal i forholde jer til løsningsforslag? Egen erfaring og viden? Uvildighed?)

Er i alene ved besøget? Hvem tager i kontakt til? Mænd eller kvinde

Hvilken feedback får i typisk fra en screening?

Hvad er den bedste/værste oplevelse hos en borger?

Oplever i at beboerne i hjemmet ikke forstår jer? Hvordan imødekommer i dette?

Hvordan modtages rådgivningen? Og hvad påvirker modtagelsen?

Hvad motiverer borgerne?