



ENGAGING HOUSEHOLDS THROUGH A DESIGN INTERVENTION: Challenging the everyday practices related to households' water and electricity consumption



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ABSTRACT

The aim of this thesis is to explore how households living in buildings labeled sustainable can be engaged in minimising their use of electricity and water. The households have been engaged through a design intervention – taking an explorative, experimental and qualitative research approach. The design intervention has drawn on the methods of Participatory Design, Living Labs and ‘probing kits’. The findings show that much of the household’s electricity and water consuming practices lie in their routines and habits and that the underlying services that make those practices possible are ‘invisible’ and taken for granted. Challenging the households ‘invisible’ and taken for granted practices in their everyday context has proven successful in making the households more aware of the services in their home. The findings reveal that some of the households electricity and water consumption is more linked to their routines whereas other parts of their consumption is more linked to the meaning associated with the practice. Furthermore, the insights reveal that practices related to convenience and comfort are difficult to change, which is related to the aspect of having the ‘*possibility*’ e.g. to do something faster. Furthermore, insights reveal that practices of cleanliness differ across the households, indicating that ‘one type fits all’ solutions are not possible when changing household practices related to cleanliness. Finally, the insights indicate that it is necessary to understand the relationship between the service and practice, as well as one practice’s effect on other practices, before designing for change. Based on the insights, inspiration and ideas gained through the design intervention and drawing on selected nudging tools, three design proposals have been developed to support the households living in buildings labeled as sustainable in minimising their electricity and water consumption. The first two design proposals aim at reducing water consumption by making low water pressure the standard function and enabling different functions for different needs. In this way, design proposal 1 and 2 addresses some of the households’ bodily aspects of performing everyday practices, by making the *automatic choice*, the *default choice*. The third design proposal focuses on reducing households’ energy consumption by enabling the households to make a competition with themselves and by using social norms to influence the households behaviour. As such, the third design proposal targets the households’ energy consuming practices in which the meaning associated with the practice is strong, by using descriptive and dynamic norms to slowly construct new norms and influence the households to pre-conform to new norms.

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PREFACE

My motivation for taking a practice theoretical perspective on the study of energy consumption derives from my upbringing in which many of the services that I take for granted today were not normal. As I grew up 'on the road' traveling around in caravans abroad, stable electricity, running water and flushing toilets were not the norm. This way of living – not being connected to any water or electricity grids – meant that electricity was produced by a generator and water was fetched and filled into 'built in' tanks in the caravans on a regular basis. The generator was only turned on occasionally e.g. to wash clothes (not 'just' for lighting), the toilet consisted of a bucket that had to be emptied everyday, the fridge was cooled down with ice bottles and running water was not guaranteed during the practice of showering or cooking etc., due to the water tanks suddenly running empty. Experiencing the shift from one normality to another normality has put the everyday taken for granted services into perspective – which is what I also aim to do in this thesis.

DISCLAIMER

The Covid-19 and the following consequences of the lock-down of the Danish society on March 13th, has resulted in the sampling process being limited to being carried out entirely online as opposed to setting up a physical stand or knocking on doors at the case sites. Furthermore, the enrollment of households might have been limited due to the use of 'probing kits' entailing that physical objects had to be entered into people's homes. Moreover, it was not possible to make a physical workshop, enabling the active involvement of the households in the development of the final design proposals.

TABLE OF CONTENTS

1. Introduction	1		
1.1. Problem area	2		
1.2. Problem formulation	3		
1.3. Goal of the project	4		
1.4. Project Outline	5		
2. Reducing energy consumption?	6		
2.1 Eco-efficiency	7		
2.1.1 LCA	7		
2.2. Certification systems	8		
2.3. Environmental, economic and social sustainability	9		
2.3.1 Buildings labeled as sustainable	9		
3. Understanding household consumption - a practice theoretical approach	10		
3.1. Social Practice Theory	11		
3.1.1. Routines, habits and the 'taken for granted' practices	11		
3.1.2. The interplay between people and materialities	11		
3.1.2.1. Material, meaning and competence	12		
3.1.3. Bundles and complexes of practices	12		
3.2. The Contextual Wheel of Practice	12		
		3.2.1. Societal Structure, Infrastructure, Near Materiality, and The Individual	13
		3.2.2 Interdependence of the elements of practice	13
		4. Changing patterns of household consumption; heating, electricity and water	15
		4.1. Historical development of amenities	16
		4.2. Household consumption of heating, electricity and water	17
		4.2.1 Heating and electric appliances	17
		Sub-conclusion	19
		4.2.2. Domestic lighting	19
		Sub-conclusion	20
		4.2.3. Domestic water consumption	20
		Sub-conclusion	21
		4.2.4. The standard way of dealing with household's re source use	22
		4.2.4.1. Informational strategies	22
		4.2.4.2. Feedback and automation	22
		5. Research design	24
		5.1. Expert interview	25
		5.2. Gathering available data on building performances	25
		5.3. Design intervention	25

5.4. Choice of sites for the design intervention	26	7.2.3. Becoming aware	46
5.4.1. Sampling strategy	26	7.2.4. Convenience and comfort	47
5.4.1.1. BOLIG+	26	7.2.5. Cleanliness	49
5.4.1.2. Urban Rigger	26	7.2.6. Influencing practices	50
5.4.2. Expanding the sample strategy	28	7.2.7. The social construction of needs	52
5.4.3. Invitation	28	7.2.8. The symbolic meaning of practises	54
5.4.4. Time frame	28	Sub-conclusion	55
5.5. Analysing the data	30		
5.6. Methods used in the design phase	32	8. Design phase	57
6. Design intervention	34	8.1. Drawing on nudging tools	58
6.1. Participatory Design	35	8.1.1. Nudging	58
6.2. Living Lab	35	8.1.1.1. Nudging-tools	59
6.3. Inspiration and delimitation	36	8.1.1.2. Descriptive and dynamic norms	59
6.4. The design intervention - a 5 Day Challenge	36	8.2. Inspiration and ideation	60
6.4.1. The design strategies of Projection	36	8.2.1 Clustering of inspirations and ideas	60
6.4.2. Probing kit	37	8.3. Existing solutions	62
6.4.2.1. Challenge-cards, bucket and battery-driven lamp	39		
6.4.2.2. Diary templates	41	9. Design proposals	65
7. Insights	43	9.1. Design proposal 1 & 2.	66
7.1. The performance-gap in BOLIG+	44	9.1.1. – 1. The default-low-pressure-kitchen-tap	66
7.2. Reflections from the design intervention	45	9.1.2. Benchmarking against existing solutions	66
7.2.1. Habits and routines	45	9.1.3. – 2. The default-low-pressure-showerhead	67
7.2.2. Invisible services	46	9.1.4. Benchmarking against existing solutions	67
		9.1.5. Coupling with social practices	67
		9.2. Design proposal 3.	68
		9.2.1. – 3. The insert-your-personal-goals system	68

9.2.2. Benchmarking against existing solutions	69
9.2.3. Coupling with social practices	70
9.3. Additional proposals	70
9.4. Final recommendation	70
10. Discussion	72
10.1. Can the 5 Day challenge Change anything?	
10.2. Is nudging more manipulative than other designs?	73
10.3. Can nudges change anything?	75
10.4. What will the changing societal structures mean for household consumption patterns?	75
11. Conclusion	77
12. References	80
13. Appendix	89



Introduction

One of the greatest challenges facing humanity in this century is climate change (Swim et. al, 2011). Climate change is perceived as a “wicked problem” or a “super wicked problem” (Introne, Laubacher, Olson, & Malone,, 2012; Levin, Cashore, Bernstein, & Auld, 2012). Wicked problems are defined as complex problems to which there are no true or false solutions, rather the solutions can only be better or worse (Rittel & Weber, 1973). The world has reached a new era in which human activity plays a significant role in climate change - namely the anthropocene age (Swim et. al, 2011). It is widely acknowledged by scientists and increasingly in the broader public, that the current anthropocentric way of living is leading to environmental problems. An implication of this problem lies within a culture of human centeredness, treating the planet as an infinite resource at our disposal (Fry, 2009). Treating the planet as an infinite resource is reflected in The Earth Overshoot Day that represents the day in which humanity every year exhausts the resources that the planet can renew for that entire year. The overshoot day occurs earlier every year. In 2019 the overshoot day occurred on July 29th, meaning that from that day we started to consume more resources than the planet was able to generate for that year (Earth Overshoot day, 2019).

A big part of this natural resource depletion is caused by the building industry (Matasci, 2006). In the EU the construction of buildings consumes 40% of the extracted raw materials and 40% of the energy consumption, making buildings responsible for 36% of the CO2 emissions (Dansk Byggeri, 2019; European Commision, 2019; Gram-Hanssen, 2014). As such, the energy consumption of buildings play an important role in reaching the Danish government’s goal of reducing the greenhouse gases by 70%, before 2030 (Gram-Hanssen, Jensen, Hansen, Trotta, & Johansen, 2020). In the last 30 years efforts to reduce energy in technology and buildings have been based on en-

ergy efficiency improvements (Gram-Hansen, 2013). This is reflected in legislative frameworks established by the EU, including the Energy Performance of Buildings Directive 2010/30/EU (EPBD) and the Energy Efficiency Directive 2012/27/EU (European Commision, 2019). However, in the last decade more holistic approaches to sustainability in the building sector have been established, beyond the eco-efficiency approach. Certification systems are gaining interest, since it offers a way to measure and compare the sustainable performance of buildings by applying a set of quantifiable criteria (Jensen & Birgisdottir, 2018). Several certification systems are relevant in the Danish market, with DGNB being the most recognized. Green Building Council Denmark (DK-GBC), has adapted the german certification system, DGNB, to danish standards and norms with the aim of spreading the use of the danish DGNB certification in the danish building sector (Larsen, 2013; Jensen & Birgisdottir, 2018).

1.1. Problem area

Even though the building sector is moving in a sustainable direction, in terms of decreasing the energy consumption in the construction and operational phase of the buildings, studies show that the absolute energy usage is much higher than expected when the residents move into the buildings. The explanation for this is partially related to the residents preferences and behaviour which indicates that the more sustainable buildings are built and designed, the less sustainable the residents act (Østergaard, et. al., 2019). The increased consumption connected to the residents behaviour is illustrated in various studies showing that the energy consumption in buildings which have higher degrees of certifications and energy labeling perform worse than buildings with lower certifications (Energistyrelsen, 2016; Hansen, et. al., 2017; Gram-Hanssen, 2014). The difference between the

actual energy consumption and the calculated energy consumption reveals an increase in the actual energy usage with 20 to 60 percent (Gram-Hanssen, 2014; Energistyrelsen, 2016). This discrepancy in the expected and actual consumption is referred to as *“The performance gap”*. (Energistyrelsen, 2016; Hansen, Gram-Hanssen & Knudsen, 2018). Results show that the residents use the efficiency gains for higher levels of comfort that among other things are related to an increased indoor temperature, heating an increased part of the building and through increased lighting (Østergaard, et. al., 2019). The translation of efficiency gains into higher levels of consumption is known as *“The rebound effect”* (Hansen, et. al. 2018). On the other hand, studies show that residents living in energy-inefficient houses dress warmer, keep lower temperatures and use less electricity than expected (Hansen, et. al., 2018).

The performance gap between the expected and actual energy performance in buildings indicates that the interplay between people and the built environment plays an essential role for understanding resource consumption. Studies show that people spend 87 percent of their lives indoors and that the practices connected to energy consumption is primarily performed in and around their homes (Klepeis, Nelson, Ott, Robinson, Tsang, Switzer, Behar, Hern & Engelmann, 2001). As such, it is important to acknowledge the understanding that everyday life routines are related to energy consumption and that the relationship between technology and people is deeply intertwined (Jensen, 2017). Governments have shown an increasing interest in behavioural change on the part of individuals and the households they are associated with, due to the prospect of increasing the rate of sustainable transformation (Newton & Meyer, 2013). However, the process of engaging the citizens is associated with a problem of lack of awareness and strategies to engage the citizens are often based on infor-

mation and knowledge dissemination (Barr, 2003; Hargreaves, 2011).

This perspective views individuals as consumers of energy, and it assumes that by providing the individuals with more information about their energy consumption they will make more informed choices and thus use less energy (Entwistle, Rasmussen, Verdezoto, Brewer, & Andersen, 2015). To challenge this perspective, this thesis takes a practice-oriented approach in which the citizens are not viewed as consumers of energy, but as practitioners who consistent with Røpke (2009), do not think of themselves as consumers of energy – but rather first of all think of themselves as practitioners who are involved in meaningful practices. Thus, the focus of this thesis is on how to engage households in minimising their electricity and water consumption by exploring their everyday practices which indirectly leads to electricity and water consumption.

1.2. Problem formulation

How can households living in buildings labeled as sustainable be engaged in reducing their everyday use of electricity and water?

To help answer the research question, I have created the sub-questions presented below.

- 1) *Are buildings labeled as sustainable as sustainable as they claim?*
- 2) *How can a practice-theoretical understanding of household consumption be used to inform a design intervention that will challenge the households everyday practices to make them more aware and reflect upon the services in their homes, that they might take for granted in the everyday?*

3) How can the findings from the design intervention – be used to inform 3-5 design proposals that will support the households in minimizing their electricity and water consumption?

In answering these questions, I have chosen to take a social practice theoretical perspective, because social practice theory acknowledges the deeply intertwined relationship between people and the built environment and takes the position that behavior is socially and culturally constructed and reproduced through the performance of taken-for-granted practices rather than by individual action itself (Shove, 2003). Social practice theory has been used to inform a practice theoretical understanding of household consumption in relation to electricity, heating and water (Chapter 4). Moreover, social practice theory has been used as a source of inspiration, in creating a design intervention (Chapter 6), with a special focus on energy in the form of electricity and water – and in analysing the findings (Chapter 7). The social practice theoretical perspective used draws on Shove as she has given special attention to studying household energy consumption.

My methodological approach has begun to first target buildings labeled sustainable to use them as case sites to examine the buildings performances. Unfortunately it proved more difficult than anticipated to enroll households in buildings labeled as sustainable. As a consequence, the study was extended to include people living in standard buildings as the aim still was to make a design intervention. B) Second, households have been engaged through a design intervention.

The main approaches and methods used in the design intervention are based on participatory design and Living Labs which offers an alternative form of engaging users than providing the users with more

information. The intention of doing participatory design and creating Living Labs is two-fold. *First*, acknowledging that the residents are experts in living in their own homes, Living Labs will be used to engage the citizens in the design process. *Second*, engaging the users through the participatory design tool of ‘probing kits’ will be used to challenge the residents’ performances of taken-for-granted practices, with the aim of bringing forth the underlying invisible forms of their practices.

C) Third, three design proposals have been created drawing on ideas and inspirations from the design intervention. To provide some concrete tools to create the final design proposal, selected nudging tools have been applied in combination with the findings from the design intervention. (Chapter 8 and 9).

1.3. Goal of the project

The actions that are currently taken in Danish building sector to put sustainability on the agenda spans, from eco-efficiency approaches to more holistic approaches to sustainability, which take the entire buildings life cycle into account – before the users move into the building. However, only when a building is occupied by the users, can it be revealed whether the building lives up to the expected performance. According to Kleis (2014), the building materials and the initial energy used to construct the buildings have its share in the CO₂ footprint, but compared to the buildings entire life span which can span from 50-100 years, the household’s consumption of energy (for heating, water and electricity) plays a much bigger part. The purpose of this thesis is to explore how households can be engaged in reducing their everyday use of electricity and water.

1.4. Project Outline

The remainder of the thesis is divided into 10 chapters, starting from chapter 2. The project begins by giving a brief account of how sustainability is currently approached in the Danish building sector (Chapter 2). The next chapter provides the theoretical understanding of household consumption, taking a practical theoretical approach (Chapter 3). Next, Chapter 4 will first give a brief insight into the historical development of household consumption and following present a practical theoretical review of studies conducted within the field of household energy consumption. In chapter 5 the research methods that have been used throughout the project will be presented, explaining why and how different methods in the thesis have been used. Following, chapter 6 will go more into depth with why and how the design intervention has been conducted whereas the insights gained from the design intervention will be presented in chapter 7. Next, chapter 8 introduces the design process, accounting for how the final design proposals have been developed, both drawing on inspirations and ideas from the design intervention, selected nudging tools as well as applying a small market research into existing solutions. The three final design proposals will be presented in chapter 9, explaining the concept, how it differs from existing solutions and what insights from the design intervention it addresses. Chapter 10 will critically discuss the use of nudging in the final design proposals and more generally discuss the role of design and governance. Finally, chapter 11 will conclude on the findings from the design intervention and the three design proposals.



2.

Reducing energy
consumption?

Despite the absence of a largely shared definition, the use of the terminology “sustainable building” is rapidly increasing (Berardi, 2013). The following framework gives a brief account of how sustainability is approached in the Danish building sector, spanning from eco-efficiency approaches to more broad and holistic measures of certification systems and the incorporation of environmental, social and economic aspects.

2.1. Eco-efficiency

In Europe buildings are responsible for about 40% of the energy consumption and greenhouse gas emissions respectively (Dansk Byggeri, 2019; European Commission, 2019; Gram-Hanssen, 2014). As a result, the building sector is receiving increasing attention in worldwide policies for sustainable development (Berardi, 2013). In the last 30 years efforts to reduce energy in technology and buildings have been based on energy efficiency improvements (Gram-Hansen, 2013). The energy performance certification scheme in Denmark dates back to the 1980s, requiring all houses to be rated from A to G, based on the calculated energy consumption (Gram-Hanssen, 2014, b). Legislative frameworks have been established in the EU, including the Energy Performance of Buildings Directive 2010/30/EU (EPBD) and the Energy Efficiency Directive 2012/27/EU (European Commission, 2019). One of the ambitious targets in the Energy Performance of Buildings Directive 2010/30/EU (EPBD) is that all member states must ensure that new buildings will be nearly zero energy buildings by 2020 (European Union, 2010, article 9). Zero or nearly zero energy buildings are designed and built worldwide requiring that the building does not use fossil fuels, but only rely on renewable energy (Zeiler, 2013). In Denmark the building industry is required to follow the BR18 energy performance framework, which builds on the Energy Performance of Buildings Directive 2010/30/EU (EPBD).

The BR18 energy performance framework, sets requirements for the buildings; energy performance framework (including the production of renewable energy equal to a reduction in the need for supplied energy of 25 kWh per m²); airtightness; design transmission loss (ensuring well-insulated constructions); and a general minimum requirement for the building envelope (ensuring that all building parts are well insulated according to required U values). All the requirements aim to ensure the energy efficiency of the buildings (Energy Requirements of BR18, 2018).

2.1.1. LCA

The Life Cycle Assessment tool, LCA, is closely tied to eco-efficiency approach and is the most standardized tool to assess eco-efficiency (Beaulieu, 2015). LCA of buildings has become increasingly relevant over the past decade due to the high environmental impacts of this sector (Anand & Amor, 2017). The LCA methodology is based on ISO 14040 and is used to evaluate the environmental impact of processes and products during their whole life-cycle, including the extraction and processing of raw materials; manufacturing, transportation and distribution; use, reuse, maintenance, recycling and final disposal. Similar to other industries, the building industry is affected by the trend of sustainable production, to which LCA provides a broadly recognized tool to help achieve sustainable building practices. Although LCA is an important tool for assessing buildings, it is still less developed in the building sector than in other industries. The reason for this is that buildings are more complex, due to various factors including the following; they have long lifetimes; *they undergo many changes in form and function; much of the environmental impacts occur in the use phase; and there are many stakeholders and very little standardization in the building sector* (Khasreen, Banfill, & Menzies, 2009,). The accuracy of LCA is limited as it is applied in the design phase

to measure the potential environmental impact. Since buildings have long lifetimes and the buildings use phase have large environmental impacts, the variations in how buildings are used can have an effect on the accuracy of the LCA (Collinge, Landis, Jones, Schaefer, & Bilec, 2013).

Due to the complexity of undertaking a full LCA, there is a potential in integrating LCA and certification systems, as certification systems are considered easier to use for thinking of buildings. Some certification systems, including LEED, BREEAM, HQE and DGNB have integrated LCA at different levels (Anand & Amor, 2017). Certification systems will be elaborated on in the following section.

2.2. Certification systems

Certification systems are gaining importance, and are increasingly becoming an integrated part of the Danish construction industry as the demand for proven sustainability rises. Certification systems have the ability to measure and compare the sustainable performance of buildings by applying a set of quantifiable criteria (Jensen & Birgisdottir, 2018). According to Yost (2018) *“Sustainable building certifications help shift the industry and drive innovation by formalising design and performance criteria so that what was once innovative becomes the norm”* (Jensen & Birgisdottir, 2018, pp. 17).

There are hundreds of different sustainable certifications for the built environment. Currently the certification systems that are the most relevant in the danish market are: Active House, BREEAM, DGNB, Green Star, HQE, LEED, Living Building Challenge, Miljöbyggnad, Nordic Swan and WELL. However, DGNB is currently the most popular certification system in Denmark (Jensen & Birgisdottir, 2018). The danish DGNB certification was launched in 2012 and builds on criterias developed by the

German organisation, DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen), from which the name originates. Green Building Council Denmark (DK-GBC) has, in collaboration with around 150 experts within the field, developed and adapted the german criterias to danish standards and norms. The goal of DK-GBC is to improve and advance sustainability in the building sector, by spreading the use of the danish DGNB certification (Larsen, 2013). Statistics of the amount of buildings being DGNB certified in Denmark, show that there has been a steady growth in the DGNB pre-certifications and certifications since 2012 (DGNB, 2020).

All the certification systems are to varying degrees based on environmental, social and economic dimensions. However, a comparison made of the certification systems introduced above, show that the certification systems generally have a strong focus on the environmental aspects of sustainability, with a main focus on environmental aspects. The social dimension follows closely after, with the main focus being on health aspects in the form of comfort and indoor climate. Finally, the economic dimension is less represented apart from in the DGNB. Among the certification systems that are relevant in Denmark, DGNB is the certification system that has the most equal focus on each sustainable dimension (Jensen & Birgisdottir, 2018).

Equivalent to the LCA, certification systems are applied before the buildings are occupied by the users which can have an effect on the accuracy of how sustainable the buildings are performing, after the residents move in.

The next section will elaborate on how non-certified buildings incorporate dimensions of environmental economic and social sustainability to label themselves as sustainable.

2.3. Environmental, economic and social sustainability

The concept of sustainability is regarded as threefold: environmental, economic, and social. Therefore, for a construction to be sustainable, it should be environmentally, economically, and socially sustainable (Illankoon, Tam, & Le, 2017). Environmental sustainability is related to the buildings' impact on nature, the environment, climate and resources. Economic sustainability requires that there is a balance between the collective expenses and the quality of the building. Social sustainability is concerned with a broad perspective of peoples health and well-being in buildings (Jensen & Birgisdottir, 2018; Trafik- og Byggestyrelsen, 2016).

2.3.1 Buildings labeled as sustainable

Apart from using certification systems to create quantifiable indicators of sustainability in the building sector, there are various buildings that label themselves as sustainable, by incorporating environmental, social and economic aspects of sustainability into the buildings. Some examples of sustainable building projects are; UN17 village, Urban Rigger, BOLIG+, MiniCO2-husene and Bolig for livet. Examining how sustainability is approached in these sustainable building projects reveal the following environmental, social and economic aspects of sustainability, elaborated on below.

Considering the environmental aspects of sustainable buildings, the actions that are currently being taken are based on: the reduction of construction waste through the use of upcycled and reused materials, the reduction of energy consumption, through the use of renewable energy sources like solar panels, heat pumps etc., the reduction of the buildings CO2 footprint throughout the buildings lifespan by incorporating a life cycle thinking perspective, and by using materials with a lower climate impact (Dansk Byggeri, 2019; Thybring, et.

al., 2019; Lendager, Group, 2018; Urban Rigger, n.d.; Realdania, n.d.).

Considering the economic dimension of sustainable buildings, there is a focus on: incorporating a long term perspective of the buildings value over time, by assessing the buildings costs related to the operation, maintenance and supply of the building, which often exceed the construction costs. Further there is a focus on optimal use of the building's space and ensuring that the building is adaptable to future needs (Dansk Byggeri, 2019).

In terms of social quality, there is focus on: increasing community, by incorporating common areas and sharing economy facilities into the building, such as a shared dining area and shared laundry facilities. Also the people's health is considered by using high quality filters and using materials that minimise toxic fumes. In addition to the social qualities of the sharing economy facilities, it supports the environmental sustainability of the building (Dansk Byggeri, 2019; Lendager Group, 2018; Urban Rigger, n.d. Realdania, n.d.).

Although all these approaches and tools all contribute to moving the building sector in a sustainable direction, they are directed at the design and construction phase. The applicability of these tools to measure the actual performance of a building is limited since they are designed to measure the potential environmental impact. The technical measurements can estimate only one building's technical energy performance, but they can not predict the actual energy consumption of the building related to the use phase (Gram-Hanssen et. al. 2020) and thus can not contribute in minimising the electricity and water consumption in the use phase.



3.

Understanding household
consumption - a practice
theoretical approach

This chapter will present the theoretical framework that the thesis draws on and how it will be used in following chapters. The theories used in this framework include Social Practice Theory, mainly drawing on Shove, (2003: Shove et. al., 2012) and the Contextual Wheel of Practice (COWOP).

3.1. Social Practice Theory

As a response to a more conventional understanding of behavioral change, social practice theory goes beyond individualistic approaches to behavioural change, and instead puts forward the social and collective construction of practices (Hargreaves, 2011). The individualistic approach takes the position that lifestyles and tastes are expressions of personal choice, in which behaviours are driven by beliefs and values (Shove, Pantzar & Watson, 2012). Social practice theory proposes a broader and holistic conceptualisation of behavioural change processes, involving many more aspects of complexities of daily life than is captured by existing approaches to behaviour change (Hargreaves, 2011). From this perspective, sustainable or unsustainable actions and consumption patterns can not be explained as linear and rational processes related to an individual's attitude, values and beliefs, but should be seen as embedded in social practices (Warde, 2005).

3.1.1. Routines, habits and the 'taken for granted' practices

The aim of practice theory is to bring forth the generally invisible forms of practice that are taken for granted. This is done by investigating the constitution of normality and the dynamics of habit and routine (Shove, 2003). According to Shove (2003), behaviour is better understood by looking at the underlying rules, resources, technologies and people that participate in constituting and reproducing the practice rather than the individual action itself. Referring to Goffman's terms, Shove (2003),

states that practices are *"...more about the production of the scenery, the lighting and the setting than the action itself"* (Shove, 2003, pp. 2). Rather than focusing on the individual choice in terms of peoples restraint or excess consumption of energy, water and natural resources, the focus should be on the services and experiences that these resources make possible. By exclusively focusing on the individual action, the broader picture of how cultural and generational change contribute to expectations and practices, disappears. According to Shove (2003), consumption is 'normality' and is driven by collective norms. From this perspective consumption should be seen as part of a material world, in which socio-technical systems have a stabilizing effect (Shove, 2003).

3.1.2. The interplay between people and materialities

Practices exist and are reproduced through its *performance* by practitioners (Shove et. al., 2012; Watson, 2012), who become 'carriers' of the practice. Watson (2012), articulates that, *"practices (and therefore what people do) are partly constituted by the socio-technical systems of which they are a part; and those socio-technical systems are constituted and sustained by the continued performance of the practices which comprise them."* (Watson, 2012, pp. 2). From this perspective the performance of a practice is what creates the link between what people do and the rest of a given socio-material system (Jensen 2017). Whilite (2008), introduces the concept of *distributed agency* to demonstrate the link between technology and behaviour, meaning that behaviour and technology mutually have the capability to shape each other. The agentive power of technology on practices can be viewed in the household appliance technologies related to, *cooking, cleaning, comfort and entertainment*, which have agency in the form of promoting certain kinds of practices. However, the practices that are promoted are also shaped

by the changing social contexts of the homes into which they fit (Whilite, 2008).

3.1.2.1. Material, meaning and competence

According to Shove et. al. (2012), a practice is built up by three interdependent relations between; *material*, *competence* and *meaning*. The material aspect of a practice encompasses objects, infrastructures, tools, hardware and the body itself. Competence refers to the practical knowledgeability required to perform a practice. Meaning, refers to the social and symbolic significance attributed to participating in a practice. Through the active integration and performance of these three elements practices are reproduced and generally recognizable entities. As an example, although the practice of driving is composed of many different components, the procedures need to be seamlessly integrated to what is commonly known as 'driving'. In this way driving has been 'black-boxed' into a single practice (Shove et. al., 2012). For a practice to remain, it is necessary that the connections between these elements are continuously renewed. As such, *"...practices emerge, persist and disappear as links between their defining elements are made and broken"* (Shove et. al., 2012, Chpt. 2 pp. 2). It is possible to break the links between the elements of practices, by redefining the elements of which a practice is made and reproduced. As an example, new technologies (materialities) like electrical vehicles, are not fixed, stable entities that can not change, but rather they acquire new meanings and forms of use (competences) as they are adapted to household situations. In turn they will influence pre-existing household dynamics (Ryghaug, & Toftaker, 2014).

3.1.3. Bundles and complexes of practices

In addition to the interlinked relations between the elements of a practice, practices themselves are also able to link to one-another, and can take the form bundles and complexes. Bundles are loosely connected patterns based on the co-location and co-existence of practices, whereas complexes represent stickier and more integrated combinations. In this way, practices are connected and shape each other, by restricting, enabling and conditioning each other (Shove et. al., 2012). As an example of complexes, the practice of grocery shopping and the practice of cooking are strongly integrated, meaning that people's grocery shopping is influenced by the meals they know how to cook and prepare or maybe what new receipts they are experimenting with.

3.2. The Contextual Wheel of Practice

The social practice theoretical approach of addressing human impact on the environment by focusing on shared everyday practices, rather than just individual behavior is an approach that is gaining interest, but this approach can be difficult to put into concrete use. COWOP provides a concrete tool for applying practice theory in an exploratory and explanatory way to support designer's reflective practices and to design effective interventions (Entwistle, Rasmussen, Verdezoto, Brewer, & Andersen, 2015). The COWOP framework can function as a boundary object providing a physical manifestation of abstract and theoretical concepts and establishing a shared understanding of how energy consumption comes about.

COWOP is based on Entwistle, et. al. (2015), experiences from multiple projects studying energy consumption and designing interventions to change energy consuming practices. The word 'Contextual' is central to the framework, stressing that actions are contextualised by the social, cultural and material setting and that these context must be considered when trying to understand or change practices.

3.2.1. Societal Structure, Infrastructure, Near Materiality, and The Individual

COWOP consists of four elements of practices; *Societal Structure*, 2) *Infrastructure*, 3) *Near Materiality*, and 4) *The Individual*. Each representing a quadrant in the wheel (see figure 1.). COWOP attempts to mediate between structure and agency, the human and the non-human, and the concrete and abstract elements that shape our daily practices. The element of 'societal structure' includes legislation or broadly accepted norms, such as standards of cleanliness. Societal structure encompasses Shove et. al.'s (2012) element of practices referred to as *meaning*. The COWOP makes a finer distinction than Shove et. al.'s *material* element, as the material is divided into the elements of 'infrastructure' and 'near materiality'. Entwistle et. al. argues that the material element in Shove's (2012) framework might not be sufficient in fully accounting for the material aspects of practices related to energy consumption. 'Infrastructure' refers to the physical environment that shapes behaviour which is not under individual control, such as architecture, automated processes of a building and from where the electricity of the building is supplied. 'Near materiality' refers to the close physical environment or technologies which are under individual control, such as the radiator or appliances plugged into the wall and is also more likely to attribute more meaning to this element. The last quadrant is the 'individual' which

represents personal values, such as a desire to live sustainably and the knowledge and skills required for that lifestyle. The 'individual', can be interpreted as being positioned somewhere in between Shove et. al.'s elements of practice referred to as *meaning* and *competence*.

3.2.2 Interdependence of the elements of practice

In the COWOP model all the four elements are highly interdependent, meaning that changes in one quadrant can create changes in any of the other quadrants. However, creating change is never a simple cause and effect process and although the wheel is divided into four equally sized quadrants, some of the elements might be more significant than others, depending on the specific case. To exemplify the complexity of change, Entwistle et. al. gives the example that, the element of 'infrastructure' to a high extent relies on the elements of institutions and legislation (Societal Structure), while legislation is shaped by 'individuals' values and knowledge, but also on technological advances. Although 'individuals' values and knowledge are personal and internalized, they are also very much grounded in and affected by shared culture and societal structures. It is therefore important to explore the connection between the different elements and how they each have an influence on different practices in different situations (Entwistle, et. al., 2015).

Social practice theory has been used to inform a practice-theoretical understanding of household consumption in relation to electricity, heating and water (Chapter 4) Moreover, social practice theory has been used as a source of inspiration in creating a design intervention (Chapter 6) and in analysing the findings (Chapter 7).

The Contextual Wheel of Practice (COWOP), has been used as a framework to apply the final design proposals within a practice theo-

retical context. The COWOP differs from Shove's framework by placing 'the individual' as a part of the wheel and by making a finer distinction of Shove's 'material' element into 'infrastructure' and 'near materiality'. Including the 'individual' in the framework is consistent with Spargaaren (2011) who argues that although there are limitations to the individualistic approach, it is not possible to apply a systemic approach that completely eliminates the individual consumer, since it is the individual that is the carrier of the practice. However, the 'individual' is not placed at the center stage, but on equal footing with the other elements and the 'individual' is viewed as grounded in and affected by shared culture and societal structures (Entwistle, Rasmussen, Verdezoto, Brewer, & Andersen, 2015).

	Shared	Individual
Abstract	Societal Structure	The Individual
Physical	Infrastructure	Near Materiality

Figure 1. the elements of in COWOP – revealing both shared and individual and human and non-human elements.



4.

Changing patterns of
household consumption;
heating, electricity and water

This chapter will first give a brief insight into the historical development of household consumption, illustrating how both technological developments and social practices have evolved. Following, the chapter presents a review of practical theoretical studies conducted within the field of household energy consumption.

4.1. Historical development of amenities

Fifty years ago the size of residence did not differ whether they were located in the countryside or inside the cities (Gadeberg, 2017). However, today there is a difference in the amount of space the Danish people use, depending on where they live. On average danish people living outside the cities have 20m² more per person than people living in the city (Sørensen, 2016). Today, the average danish person lives on 52m² compared to 42m² about 40 years ago. This evolution can be seen in relation to social aspects such as a rise in societal wealth causing people to consume more, an increase in single people living alone, averagely using more space than people living together and cheaper mortgage opportunities.

Buildings take up a lot of resources, both considering the materials used to build and the maintenance and operational use of the building. According to architect Anders Brix, it is a problem that, *"We become more and more wealthy and get more and more things. Even if new houses are far more energy efficient than earlier, we therefore do not save in the end. Because the savings are swallowed by higher comfort levels – both by building bigger, filling the many square meters with things, and by heating the whole house, because now it is energy efficient"* (Espersen, n.d.). Shove (2004), argues that the meanings of comfort have changed considerably in recent years. As a result people expect the indoor temperature to remain the same all year around and

they do not want to wear bulky sweaters indoors. This trend constitutes a significant environmental problem, since maintaining these comfortable conditions requires the use of more resources than earlier (Shove, 2004).

Today space is not associated with practical or functional use, rather it is about ideals and dreams (Gadeberg, 2017). According to sociologist and housing researcher, Mette Mechlervorg, *"Space is about the good life. About creating universes and scenes, where we can show our values and create the life we want to give our children and show the world outside..."* (Gadeberg, 2017). Following, the different rooms and how the rooms are perceived has changed over time. Earlier there was a clear division between private rooms and official rooms the guests were allowed in. Also, there was a clear separation between going to work and leisure time. Today these borders are much more fluid. The kitchen has changed from being perceived as a workspace especially for cooking, to being an integrated part of the living room. The kitchen is now a social space in which people cook together, have a cozy time together, eat together and spend their time. The office and desk is replaced with the dining table at which work is done on a laptop from home. Furthermore, 100 years ago, most often the whole family slept together in one room whereas today it is very common that each child has its own big room with space for, computers, toys, seating corner etc.

Earlier the bathroom merely consisted of a toilet. In the 1930's small bathrooms became more common and since, the bathroom has evolved along with the other rooms. Today having several bathrooms and a guest toilet is common and bathrooms are increasingly implemented as a wellness room (Jensen, 2017, a). As nearly all households in Denmark today have bathrooms and washing machines, cleanliness is no longer a way of demonstrating social status (Shove, 2007). According

to Shove (2003), the practice of bathing is related to several dimensions consisting of the, self and society; body and nature; and pleasure and duty. *First*, bathing can convey messages about who you are and how you fit in society. Referring to Goffman (1969), Shove (2003), states that bathing is a *“back-stage preparation for public, front-stage appearance”*. *Second*, bathing is associated with creating benefits for the mind and body. *Third*, bathing is on the one hand, related to personal pleasure and luxury, associated with long lingering baths and on the other hand, rapid showering is related to obligation associated with waking up and getting ready for a new day (Shove, 2003).

Residential lightning patterns have also evolved along with both technological developments and social practices. Technological developments, changing from fire-based lighting, to gaslight and later to the electrical light bulb as well as changes in domestic practices within the home, such as cooking and cleaning have influenced lighting practices (Jensen, 2017, b). Today lighting *“is a practice of attuning atmospheres for a variety of activities to take place in the home...”* (Bille, 2019, pp.8). These activities take place around social gatherings, cooking, relaxing, entertaining, cleaning and feeling secure (Bille, 2019). Lighting trends reveal that it is not necessarily the energy consumption that is being considered when people illuminate their homes, rather it is creating the right atmosphere (Jensen, 2017, b). Today, people use their residence to show who they want to be (Jensen, 2017, a).

Although most households in the 1930s and 1940s had electricity, it was almost exclusively used for lighting. In the 1960s and 1970s the spread of electrical appliances accelerated which resulted in changes of household consumption practices, such as cooking and washing. Washing practices changed from gathering all the laundry over a month and using a whole day for washing, to the norm of washing whenever

something was dirty. The introduction of the refrigerator did not immediately result in changes to the practice of shopping from day to day. The change in practice of doing weekly shops should be understood in relation to broader infrastructural changes, such as people moving out to the suburbs and the establishment of supermarkets (Gram-Hanssen, 2011).

4.2. Household consumption of heating, electricity and water

The following section will present a practical theoretical review of literature and studies conducted within the field of household energy consumption (of heating, electricity and water). Much of the Danish literature in this field is informed by PT. Kirsten Gram-Hanssen is one of the front figures within the Danish context and Charlotte Jensen has conducted several studies especially exploring the act of illuminating the home.

4.2.1 Heating and electric appliances

In Denmark substantial efficiency improvements have been made the last 30 years, both with regard to household appliances and buildings. According to Gram-Hanssen (2013, pp. 448) final energy consumption in households is a result of the following four elements: *the number of technologies, the size of the technology, the energy efficiency of the technology and the user behaviour in relation to the technology*. She shows that the energy efficiency gained through technological efficiency is counterbalanced by the growing amount of appliances in use and a bigger living area. It is revealed that energy efficiency improvements within the housing sector in Denmark has made it possible to heat a certain area by using only 70 % of the energy used 30 years ago. In the same period of time, the heated area has risen by 30-40%, resulting in

a final energy consumption that has been stable over the past 20 years.

Correspondingly, Gram-Hanssen (2013) shows the average electricity consumption per appliance sold in Denmark decreased over the last 30 years. Nevertheless, the amount of appliances have also risen in the last 30 years, resulting in the energy efficiency gained is counter-balanced by the growing amount of appliances in use. A review made on the rebound effect within the household sector shows that 20 % of the efficiency improvements in buildings and appliances are turned into higher levels of consumption as a result of user behaviour, involving higher levels of comfort. However, the growing consumption does not necessarily relate to energy efficiency. The growing number of appliances and amount of space used must also be understood as a consequence of other societal processes, such as changing social norms and expectations, following from new technical possibilities.

Also, studies comparing the heating (space and water) and electricity consumption (appliances and lighting) for completely identical houses, reveal that heating consumption can vary with a factor 3 and that electricity consumption can vary with a factor 5 between households (Gram-Hansen, 2013). This means that realistic potential for reducing energy consumption in households is inseparable from the way in which residents behave in the buildings, involving the amount of heated space and level of temperature, along with the number of appliances (Gram-Hansen, 2013).

Studies conducted on standby consumption (Gram-Hanssen & Gudbjerg, 2016) and the resource intensive domestic practices of heating and laundry (Jensen & Friis, 2019) takes a practice-theoretical approach for challenging energy consuming practices of heating and electricity. Gram-Hanssen and Gudbjerg's (2006) study standby consumption in in-

formation and communication technologies (ICT). In the study 30 households' ICTs were continuously measured while they had a visit from an energy advisor who visualized and explained for the families, how much electricity each of their ICTs used on standby mode. The study revealed that the socio-technical configuration of each family played a role in implementing the change. The families who implemented the change did so along with rearranging the technological configuration, to make it more simple to turn off, along with incorporating new procedures into this family's everyday routines. The study found that it was easy for the families to maintain the new habits together with a change in technology, because there was a change both in the knowledge and the elements with which they engaged, holding the practice together. On the other hand, for the families that did not change their standby consumption, the socio-technical configuration was more complex, due to multiple users of the same devices, spatial arrangements etc., which made it more complicated to change the practice (Gram-Hanssen & Gudbjerg, 2006).

The other study conducted by Jensen & Friis, (2019) on resource intensive domestic practices has developed a Living Lab approach in which peoples practices have been the unit of analysis and intervention. The ENERGIZE 'Living Labs' approach has been conducted in Danish households, in which resource intensive practices, related to home-heating and laundry routines have been challenged over a period of 11 weeks. Studying people's laundry and heating routines through a practice-theoretical approach, has made it possible to question ideas about personal hygiene, social signals of dressing, ideas of comfort, ideas of 'making home' and 'having guests over' (Jensen & Friis, 2019). In the study the participants were challenged to reduce their laundry by half and reduce their indoor temperature to 18 degrees. To facilitate the

challenge the participants were provided with a 'Challenge Kit', which among other things provided them with a coat rack to separate worn and dirty clothes and symbolic objects like socks, to put focus on heating the body, rather than heating the space. The active participation made it possible to explore nuances in the socio-material dynamics of laundry and heating and it also created a temporary space that lasted long enough to establish the basis for shaping habits in the participants' natural contexts. The results showed that some of the participants found ways to wear clothes for a longer time than prior to the experiment. Others did not manage to wear their clothes longer, but the experiment made it possible for them to see where and how it did not work for them.

Sub-conclusion

The studies reveal that technological efficiency alone is not sufficient for minimising household heating and electricity consumption, but that a realistic potential for reducing heating and electricity consumption in households is inseparable from the way in which residents behave in the buildings. Studies taking practices at the unit of design, by challenging peoples heating and electricity practices show a potential in exploring new nuances of the socio-technical configuration of the households everyday practices. The next section will explore further into everyday practices related electricity consumption, connected to domestic lighting.

4.2.2. Domestic lighting

Since 2009, domestic lighting has been a part of the European Commission's Eco Design directive for energy using products, meaning that only the most energy efficient light emitting diodes (LEDs) will remain

due to regulations in the near future. In an attempt to guide consumers to choose the right energy efficient light, the Danish Energy Savings Trust (DEST), has published several guides to the different technologies. However, there are many studies within the field of domestic lighting that suggest that the act of illuminating the home is more than, solely, an energy consuming act (Jensen, 2013).

The social practice of household lighting concerns the acquisition, installation and use of lighting technologies. The lighting technologies include light bulbs and light fixtures and lighting appliances (different kinds of lamps), automated lighting technologies, and lighting controls. The household practices related to lighting involve the occasional actions of installing fixtures and purchasing lamps, whereas the routine actions involve switching lights on and off. The institutional arrangements that shape household lighting practices involve energy regulations, energy supply, building regulations, the market of light bulbs and light fittings along with government policies and initiatives (Crosbie & Guy, 2008).

Jensen (2017) explores how the current Danish ways of illuminating their homes have come about, by presenting a historical account of several spatio-temporal moments in the development of domestic lighting. Jensen (2017), finds that residential lighting has evolved as a result of ever-changing dynamics across multiple "sectors", involving electricity grids and infrastructures, buildings and appliances, as well as various household related practices (Jensen, 2017). It is not necessarily the energy consumption that is being considered when people illuminate their homes, rather it is about creating the right atmosphere (Jensen, 2017 b).

A study made by Crosbie and Guy (2008) on energy use and household lighting practices in the UK discusses how lighting choices

tend to co-evolve with the household lighting practices portrayed in the media. They show that the lighting practices promoted across the UK and Europe is about using multiple appliances to create a homely atmosphere. As an example, the study points to the Swedish furniture company, IKEA's marketing material which states that *"often a combination of different types of lamps is required to create a comfortable light"*, and *"mixing different kinds of light can create a cosy and welcoming atmosphere and encourage us to enjoy our homes more"* (Crosbie & Guy, 2008, pp. 13). The study shows that the increase in the energy used to light homes is a result of lighting rooms using multi-source lighting from walls, table lamps and multiceling lamps and that these lighting practices are intertwined with images of stylish, cozy and comfortable homes portrayed in the lighting advertising media.

Exploring aspects of 'illuminating the home' with 8 low energy households in Stenløse Syd and 8 households in the ecological community, Munksøgård, Jensen (2013), show that although energy is important, it is what the light facilitates and supports that is important in an everyday life perspective. She suggests that the halogen spot and the spot-technology may have resulted in a lighting pattern that consumes the same or more energy compared to the lighting patterns connected to the incandescent light bulbs. The lighting patterns connected to the spot technology has resulted in many and different light bulbs and lamps, used for different practices such as cooking, dining, entertaining, showering etc.. The results from the two cases of Munksøgård and Stenløse Syd, also showed that although aspects and connotations related to light and homeliness, were common across the two cases, there is still 'something else' that makes groups within the same society and culture differ from each other. In the study it was revealed that although the two cases have equal access to information about making energy efficient

choices, the Munksøgård group were generally more aware and had more efficient lighting technologies in their homes. This is explained by aspects of community and social learning within the Munksøgård community in which aspects of 'living together', sharing and participating in many aspects of daily life plays a role (Jensen, 2013).

Sub-conclusion

Studies conducted on domestic lighting reveal that electricity consumption is not the primary consideration when people illuminate their homes. Following, the increasing efficiency of lighting technologies is counterbalanced by an increase in the electricity used to light homes a result of using multi-source lighting. The multi-source lighting is related to connotations of homeliness and creating 'the right' atmosphere for different practices. However, it is also revealed that different groups within the same society and culture can differ which can be explained by participating in different communities and aspects of social learning.

4.2.3. Domestic water consumption

Various efficiency measures in the wastewater treatment plants have resulted in household water consumption steadily decreasing over the last 30 years with a 40% reduction (Awad, Holm, Aarøe, Sørensen, Bjerregaard & Bjørno, 2018). However, today, the Danish household consumption still accounts for 65% of the purchased water, in which the average danish person uses 103 liters per day (Awad, et. al. 2018).

According to Gram-Hanssen (2007), a big part of water consumption is connected to practices of cleanliness, related to more frequent showers and clothes washing. Household water consumption related to practices of cleanliness is reflected in water consumption statistics, revealing that showering and personal care accounts for the largest share

of household water consumption, representing 45% of the total household water consumption. The following most water consuming practices are flushing the toilet and clothes washing, accounting for respectively 15 % and 13 % of the household water consumption. Following, dish-washing and cleaning accounts for 10 % of the household water consumption, whereas the practice of cooking accounts for 7 % (Gregersen, 16. January, 2019). The consumption of hot water is also estimated to account for 15-40% of a building's need for heating. In efficient buildings hot water consumption accounts for a bigger share of the total consumption, whereas it accounts for a smaller share in non-efficient buildings (Gram-Hanssen, et. al., 2020).

Water consumption related to practices of cleanliness is reflected in a study conducted by Gram-Hanssen (2007), that reveals that teenagers are being socialized into showering and changing clothes everyday. These cleanliness practices are being passed on from parents to children and are also subject to strong peer-group influence (Gram-Hanssen, 2007). Though the study reveals that families vary in their habits of showering and laundering, the broader norms connected to practices of cleanliness are strongly related to avoiding smell and sweat, and may be a way of showing that one is within the range of normality. Families with a strong focus on cleanliness shower at least once a day, whereas other families showered two or three times a week. The practices of cleanliness in relation to peer-group influence are related to social acceptance and belonging to a special group. In the study a teenage girl describes how she showers every morning to not smell bad, as it is not socially acceptable to smell bad in school and a teenage boy explains that he feels obligated to inform his friends if they smell bad (Gram-Hanssen, 2007).

The study also revealed that on the one hand the households

had an economic and environmental concern about the costs of wasting energy and water, but on the other hand these concerns did not have an influence on their cleanliness habits. Especially one family expressed a strong environmental concern and acted environmentally considerate in terms of buying organic food and bicycling instead of driving. However, the environmental concern was not reflected in the households water and electricity consumption. This difference can be explained in that buying organic food and living without a car are both visible and conscious acts and therefore easier to regulate through conviction than the daily unconscious habits of using water and electricity.

A bathing study conducted in the Netherlands, taking practices as the unit of design has explored what less resource intensive forms of bathing might be in the future. More specifically the study questions whether and how 'splashing' could work as a less resource intensive reconfiguration of existing bathing practices in the Netherlands. The study involved a lab setting of a simulated bathroom with a rough prototype in which improvisation actors were asked to perform a fictive scene of their splashing "routine" in detail, followed by an interview. The study indicates that the amount water required for splashing can be considerably lower than showering, due to a decoupling from water use and bathing duration. However, the study also reveals some negative effects as the soap could potentially become more central to practice and cause negative effects on the environment due to water pollution.

Sub-conclusion

The studies presented above reveal that although there has been a substantial reduction in household water consumption due to efficiency measures in the treatment plants, there is still a potential in minimising household water consumption by turning the focus towards practices

related to water consumption. The statistics and studies on water consumption reveal that the largest areas of water consumption are related to practices of cleanliness, clothes washing and toilet flushing. Further, it is revealed that practices cleanliness are being passed on from parents to children as well as being subject to peer-group influence.

4.2.4. The standard way of dealing with household's resource use

Although the studies presented above provide some examples of engaging households in minimising their energy consumption in a practice oriented way, the predominant ways in which citizens are currently engaged in reducing their energy consumption are based on informational strategies, feedback and automatisisation. This section gives a brief account of those informational strategies and motivates why the households in this project have been engaged through a design intervention.

4.2.4.1. Informational strategies

Though there has been a shift in attitudes towards the recognition of citizen participation in governmental strategies for sustainable development, the process of engaging the citizens is associated with a problem of *lack of awareness*. As a result the strategies used to engage the citizens are often based on information and knowledge dissemination, assuming that it will lead to attitude and behavioural change (Barr, 2003; Hargreaves, 2011). The strategy of information disseminations has been referred to as a linear model, assuming that there is a rational one-way flow of information (Barr, 2003; Eden, 1998), also referred to as: "*information-awareness-concern-action*" (Newton & Meyer, 2013, pp. 1213). However, many studies show that merely using informational strategies to change behaviour fails (Barr, 2003; Eden, 1998). It is increasingly recognized that individuals do not exist in a social vacuum (Hargreaves,

2011). Studies reveal that consumers that are well informed about environmental harmful behaviour do not necessarily change their consumption patterns as a result of increased information and information does not automatically lead to rational action (Lorenzen, 2018).

A study made by Newton and Meyer (2013), exploring the attitude-action gap in household consumption, shows that there is no difference in the consumption behaviour between people with high pro-environmental values, attitudes and intentions and people that do not hold these values. This attitude-action gap can be explained through the deep-rooted habits and practices performed around households along with the lack of norms and values in western societies explicitly promoting environmental conservation. Newton and Meyer (2013) find that many of the habits and practices that promote consumption are based on comfort, convenience and cost factors. It can be viewed as a culture of unsustainable consumption which is reflected in a dominant set of behaviours at present (Newton & Meyer, 2013). Newton and Meyer (2013), suggest that social practice research can add value to the understanding of people's consumption practices.

4.2.4.2. Feedback and automation

Other strategies of engaging the citizens revolve around the provision of data and smart technology, and can broadly be defined as *energy feedback* and *home automation*. Strengers (2014) refers to this view of the consumer as the 'smart consumer' or 'the Resource Man'. According to Strengers (2014), the data and technology made available to consumers through smart energy technologies is designed to "*empower consumers to take control of their consumption and make informed choices...*" (Strengers, 2014, pp. 26). The energy feedback and provision of data implies getting smarter and more informed about resource de-

cisions through access to information about their energy consumption. Automated technology involves the provision of technologies that seek to automate appliances, lights, or the home itself so that energy management is taken care of on the occupants' behalf. However, Strenger (2014), argues that the perspective of energy consumers as 'the smart consumer' or 'the Resource Man' is narrow and problematic. Rather than designing for the smart consumer, who is perceived as interested, immersed and engaged in managing their energy demand, the focus should be on the daily domestic dynamics and routines involved in preparing meals; showering, doing laundry, cleaning; and making spaces and people comfortable (Strenger, 2014).

In contrast to viewing individuals as consumers of energy, who need additional information, this thesis takes a practice-oriented approach in which the citizens are not viewed as consumers of energy but as practitioners, who consistent with Røpke (2009), do not think of themselves as consumers of energy. Rather they first of all think of themselves as practitioners who are involved in meaningful practices of getting on with their everyday lives. To engage the households in minimising their electricity and water consumption a design intervention has been developed with the aim of exploring into the households everyday practices, as an alternative to providing the users with information.

5. Research design

This chapter will account for why and how different methods have been used, including: an expert interview, the use of available data, creating a design intervention, the sampling and recruitment strategy to enroll households and finally an explanation of how the data from the design intervention has been analysed. However, the design intervention will be presented briefly and elaborated on in depth in chapter 6. For the methods used, a qualitative approach has been applied to gain in depth insights and all data has been obtained through empirical means.

5.1. Expert interview

An expert interview with Andrea Mortensen, who is a researcher at the Research Center for buildings, energy, water and climate (UC Viden, 2020) has been conducted. The reason for interviewing Andrea was that she has conducted several projects within the field of buildings, energy and nudging design (Bech-Nielsen, & Mortensen, 2017;). I found Andrea as she had been speaking at a conference for Estate Media, about nudge designs within buildings. The goal with interviewing Andrea was to get her expert knowledge on making a concrete design proposal for reducing household energy consumption by applying nudging designs. The interview was conducted online through the Teams platform.

5.2. Gathering available data on building performances

To examine whether buildings labeled as sustainable as they present themselves, available data on the performance of BOLIG+ have been obtained through Statens Byggeforskningsinstitut (SBI) (the official building research institute in Denmark) and through the energy management system, eviShine, that collects all the data on the apartments in BOLIG+ energy consumption

(heating, electricity and water). Data on BOLIG+ heating and electricity consumption has been obtained through a report measuring and evaluating performance of BOLIG+. However, the report does not measure the building's water consumption. Data on the whole buildings water consumption has been obtained through the system eviShine and has been sent to me in the form of screenshots from the household that participated in the design intervention.

An attempt to collect data on the energy consumption of Urban Rigger has been made. Unfortunately it proved more difficult than anticipated to collect data on Urban Riggers energy consumption. Data from the remaining four buildings have not been obtained due to: a lack of data on the zero-energy building at Frederiks Brygge because of its limited time in use (under a year); and three of the buildings not conforming to the 'label' of sustainable buildings. Thus, data from BOLIG+ is the only data on the buildings performance gap in this study.

5.3. Design intervention

A design intervention has been conducted to engage the households in minimising the performance gap. The design intervention takes an explorative, experimental and qualitative research approach drawing on the methods of Participatory Design, Living Labs and the use of 'probing kits'. To get an insight into the residents daily routines in their homes, as well as making them reflect upon their taken for granted practices, they will be actively involved in the design process through a design intervention that will take the form of a Living Lab setup. The design intervention will be explained more in depth in chapter 6.

5.4. Choice of sites for the design intervention

The following section explains how and why the households participating in the design intervention have been selected and recruited.

5.4.1. Sampling strategy

It was originally planned to recruit 5 - 10 households who lived in DGNB certified buildings or in buildings labeled as sustainable. The main purpose of recruiting the households was to challenge and get an insight into their everyday practices, with the aim of using the insights to create a design proposal. Due to a lack of response from DGNB certified buildings, the focus was directed at buildings labeled as sustainable, without being certified. Targeting buildings labeled sustainable, two households have been recruited. These buildings include, Urban Rigger and BOLIG+. The buildings will be further elaborated on below.

5.4.1.1. BOLIG+

BOLIG+ is part of Realdania By & Bygs work with experimental construction of new buildings (see *picture 1*). Bolig+ is build according to the 2020 standard, with an calculated consumption to be -38,8 kWh/m²/year, due to a large area with solar panels. On Realdanias homepage, BOLIG+ is described as: *“Denmark’s first active energy producing, zero energy apartment building, with a focus on healthy residentials, perfect indoor climate, and quality of life - within ordinary construction cost”* (Realdania, n.d.). The property consists of 10 apartments between 77 and 132 m². The residentials at BOLIG+ are referred to as 100% zero energy, both including heating, ventilation, as well as the individual electricity consumption, including electricity for appliances, cooking and lighting. For the building to be a zero energy building BOLIG+ is equipped with

solar panels on the roof and facades, providing an estimated performance of about 45.000kWh pr. Year. The building delivers a minimum of 1700kWh electricity per apartment, per year and the apartments are designed to have an indoor temperature of 22 degrees, compared to the regular demand of 20 degrees. The building is equipped with the system zensehome making it possible for all switches, lamp outlets and electrical outlets to be programmed. The residents can monitor all their energy and water consumption through the web based system eviShine, including electricity, heating and water.

5.4.1.2. Urban Rigger

Urban Rigger consists of seven floating housing units, each consisting of 12 residences of respectively 23m² – 30m². Urban Rigger is described as a floating, flexible, energy efficient and mobile property (see *picture 2*). On Urban Rigger’s webpage, sustainability is articulated and addressed in one of the fans labeled ‘SUSTAINABILITY’ (Urban Rigger, n.d.). In the Sustainability fan there is a focus on environmental sustainability and energy efficiency through the use of hydro source heating together with low energy pumps and solar panels to create energy. A field visit to the place revealed that one of the rooftops is designed to collect rainwater which can then be used to flush the toilets, wash the laundry and water green areas. Also, a social dimension became visible from the field visit as community is encouraged through the establishment of common areas, such as a shared green courtyard, a bathing platform, a communal roof terrace, a lounge and dining area and a shared laundry facility. Though not, directly articulated, a long term economic perspective can both be seen in the flexibility and adaptability of housing units and through the use of renewable energy supply. In terms of flexibility and adaptability the apartment blocks can easily be assembled depending



Picture 1. BOLIG+.

Picture 2. Urban Rigger.



on the size desired and can easily be moved (Urban Rigger, n.d.).

The household from BOLIG+ was recruited as the woman who sent out the invitations to the residents of BOLIG+ were interested in participating herself. Unfortunately none of the other households from the building enrolled in the research. The household from Urban Rigger were recruited through connections in my network. The household of Urban Rigger also sent out the invitation to the other households at Urban Rigger, but none of the other households enrolled in the research.

5.4.2. Expanding the sample strategy

As no further households from BOLIG+, Urban Rigger enrolled in the design intervention, the sampling strategy was expanded to include households from my own network - not necessarily living in buildings labeled as sustainable. Following, convenience sampling (Blomberg, Burrell, & Guest, 2003) has been used to recruit four households from my own network; three households living in standard apartment buildings and one household living in a zero energy building. Though the research is targeted at buildings that are labeled as sustainable, it can be argued that the social practices of households living in standard buildings can still give a valuable insight on how to minimise the electricity and water consuming in buildings labeled as sustainable. The households from both types of buildings are still a part of the broader societal and cultural context in Denmark which shapes the households social practices.

As a result a total of six households have been recruited (from three buildings labeled as sustainable and three standard buildings) to participate in the research, consisting of: a young couple living at BOLIG+; a young couple living at Urban Rigger; a family consisting of a young couple

and child in the age of 8 years, living at Frederiks Brygge (zero energy building); a young couple living at Johan Kelles Vej; a young couple living at Præstelængen; and a young man living at Skoleholdervej. To ease the reading for the reader the following abbreviations will be used for the following households in the remaining of the report. Frederiks Brygge will be referred to as FBG; Johan Kellers Vej will be referred to as JKV; Præstelængen will be referred to as PLG; and the household at Skoleholdervej will be referred to as SVH. BOLIG+ and Urban Rigger will continue to be referred to in full.

5.4.3. Invitation

Due to the lock-down of the society the sampling process has been limited to being carried out entirely online as opposed to setting up a physical stand or knocking on doors at the case sites. To recruit the households an invitation was sent out online, giving the households an insight into the study and providing them with the necessary practical information and details for participating. Special attention was put into creating a headline that would catch the attention of the households as well as creating a simple 3-step overview of what it entailed to participate (*see figure 3*).

5.4.4. Time frame

The design intervention spanned over 5 days. In most cases the design intervention spanned from Wednesday to Sunday, with the exception of one household (BOLIG+) who started the design intervention on a Tuesday. The purpose of placing the intervention on these days was originally to include the weekend in which people are often at home the whole day. However, to the unforeseen event and guidelines of COVID-19 the households were home most of the time during the intervention also in

Picture 3. Invitation to the '5 Day Challenge'.



DO YOU LIKE TO CHALLENGE YOUR-SELF? PARTICIPATE IN THE 5 DAY CHALLENGE

Have you ever experienced opening the water tab in the morning, but no water came out?

Do you want to challenge your everyday routines and the available services (electricity, water) in your home, which you might not notice in your everyday and which you might take for granted? As a part of my thesis in Sustainable Design at AAU in Copenhagen, I want to explore, challenge and make visible peoples household practices, along with the underlying structures making these practices and services possible. Based on this research, my aim is to create a design proposal that can make us more consious of our everyday behaviour.

15 challenges

For 5 days you will get a new challenge (f.x. that you can't use the water in the kitchen for one day)

25 min. Diary

Use 5 min. on writing down your reflections of the challenge

3?

If you want to, you're invited to participate in a 2 hour workshop, to develop a 'nudge' design

WIN A CINEMA TICKET

Participating in the workshop, gives you the opportunity to win a cinema ticket

By the end of the research, two names will be picked from the 5 - 10 participants

PRACTICAL INFORMATION

The challenge will take place in your own home

When? Wednesday - Sunday in week 14 (or upon agreeement)

Anonymity if wanted

Workshop: upon agreeement

MATERIALS

By participation, you will be provided with a 'kit' containing all the nessecary materials, challenges and instructions to complete the 5 Day Challenge

CONTACT- INFORMATION

If you want to participate or have any questions, I can be reached at:

Mail: susannenoer90@gmail.com

Mobil: 42426928

the week days. The research has taken place over 3 weeks (week 13, 14 and 15). The households JVK, PLG and SHV all participated in the first week (week 13). The households at Urban Rigger and FBG both participated in the second week (week 14). Finally the household, BOLIG+ participated in the last week (week 15).

5.5. Analysing the data

Analysing the data from the design intervention, has been conducted over three main rounds: 1) analysing the data with an open mind, 2) applying theory to the data and 3) analysing the data with a specific goal in mind.

The first round of the data-analysis has been based on an attempt of letting the data speak for themselves (Brinkmann, 2014). In this round, *first*, all the households' reflections from each day have been identified and thematically grouped, based on each day. *Second*, overlapping themes between the different days have been identified and merged, resulting in the 6 overall themes presented below.

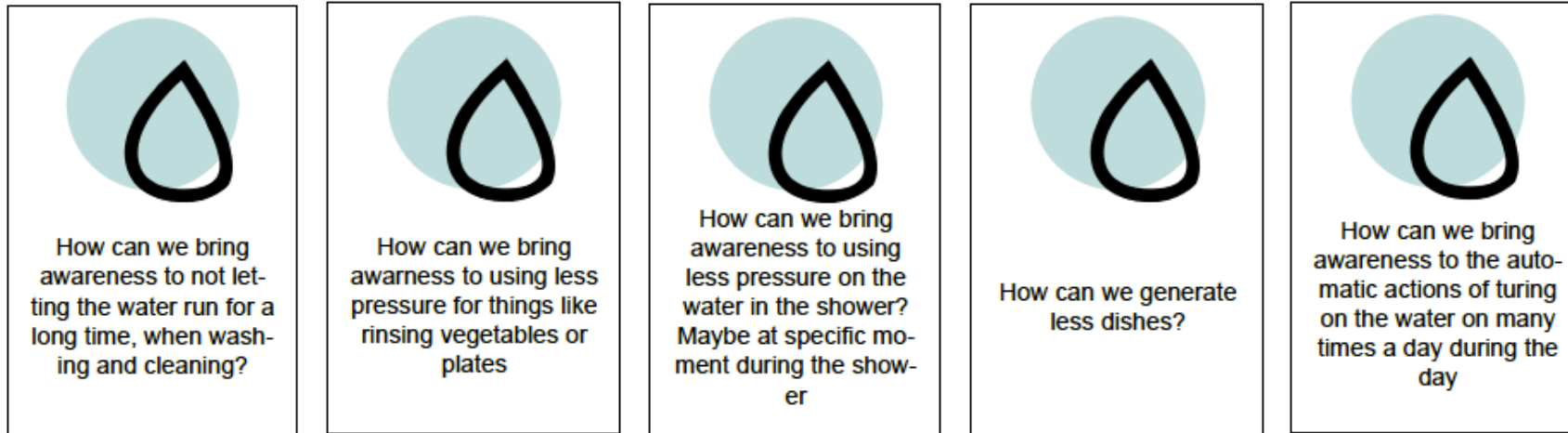
1. Habits and routines
2. Invisible services
3. Becoming aware
4. Convenience and comfort
5. Cleanliness
6. Changing practices

In the second round a more theoretical approach has been taken (Brinkmann, 2014), in which a social-practice theoretical analysis and interpretation has been applied to insights from the diaries, resulting in the 2 categories below.

7. The social construction of needs
8. The symbolic meaning of practices

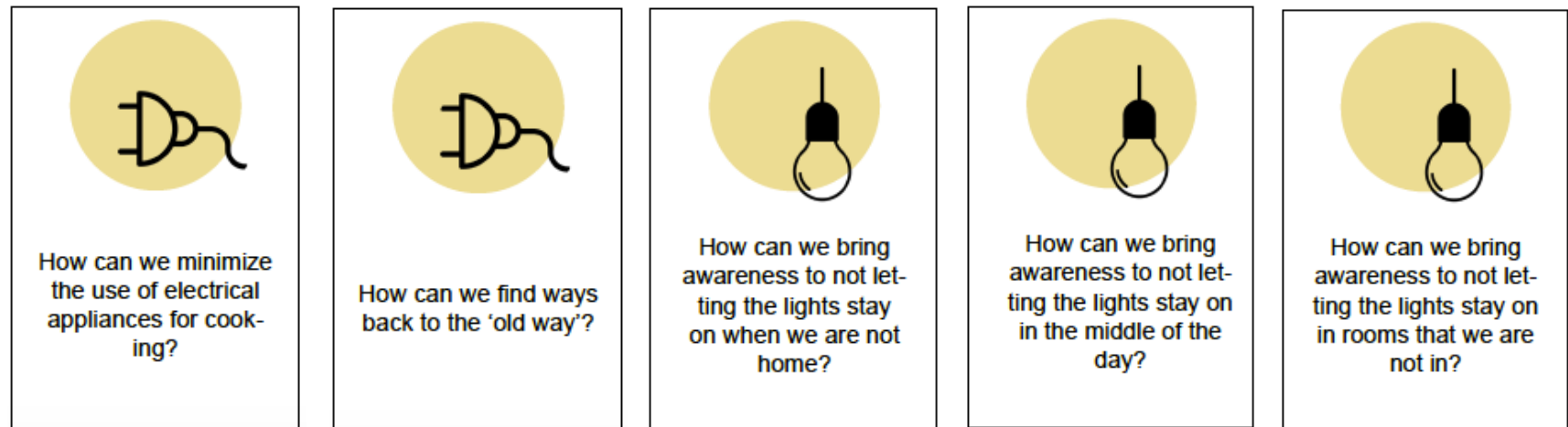
In the third round the diaries have been analysed with a clear focus on identifying ideas and inspirations from the households with the aim of using these ideas and inspirations in the design phase. The ideas have all been identified directly from an 'idea box' placed in the right corner of the diaries or ideas explicitly referred to as an idea in the diaries. The inspirations have been identified based on general inspirations e.g. that one of the residents wrote that she could be more aware of not letting the water run while cleaning. To organize the ideas and inspirations, templates have been created consisting of inspiration cards and idea cards (*see pictures 4, 5 & 6*). The ideas from the 'idea box' and other idea suggestions in the diaries have been placed into the idea card templates. Similarly, the inspirations from the diaries have been placed into the inspiration cards. The aim with translating the inspirations and ideas into cards was to use them as boundary objects to support the design process (Carlile, 2002).

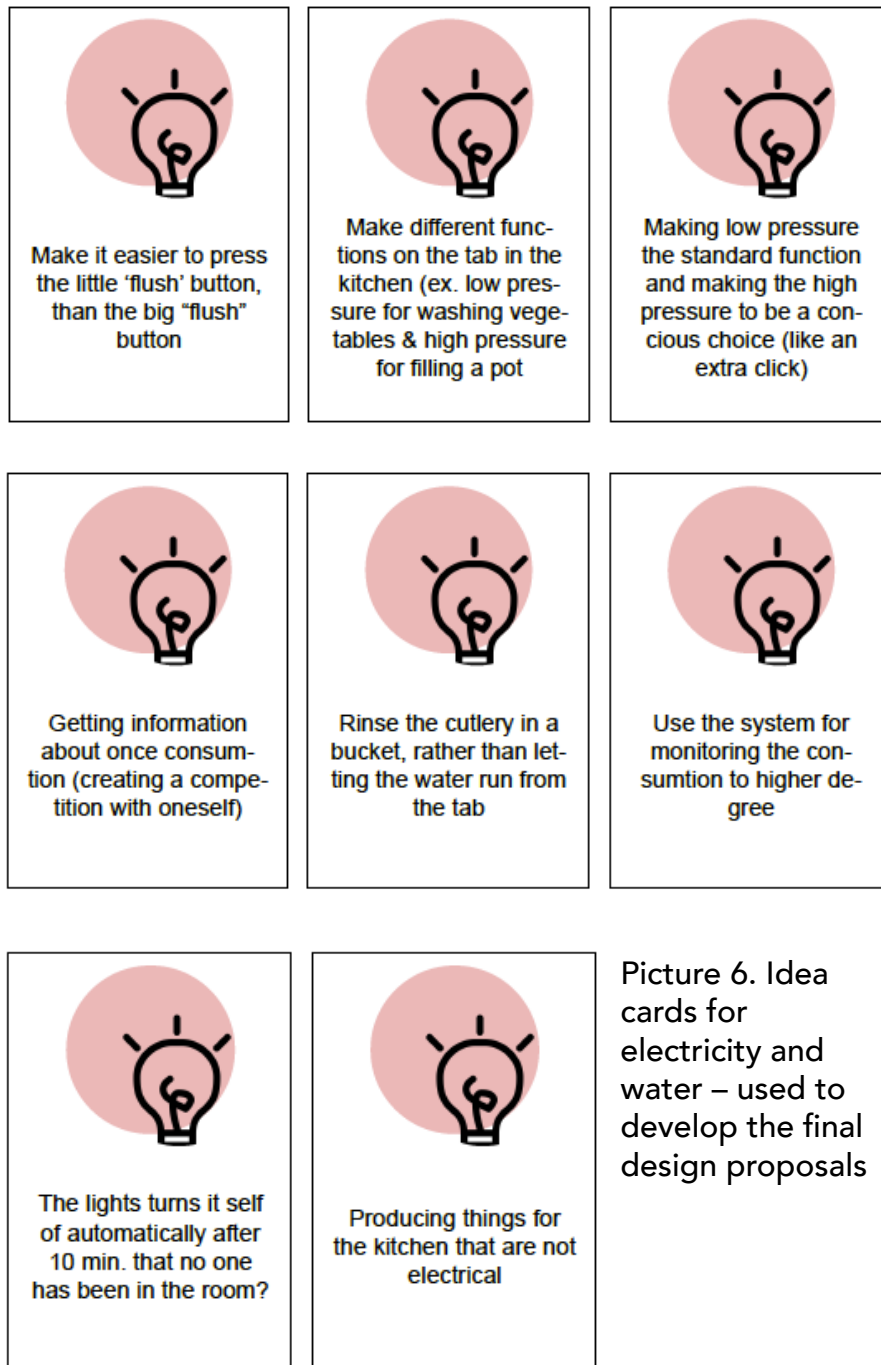
The knowledge gained from the expert interview, has mainly been used to inform the choices made in the final design proposals, in which nudging tools will be applied. Knowledge used from the interview with Andrea Mortensen will be referenced as; Mortensen (2020).



Picture 4. Inspiration cards for water – used to develop the final design proposals

Picture 5. Inspiration cards for electricity – used to develop the final design proposals



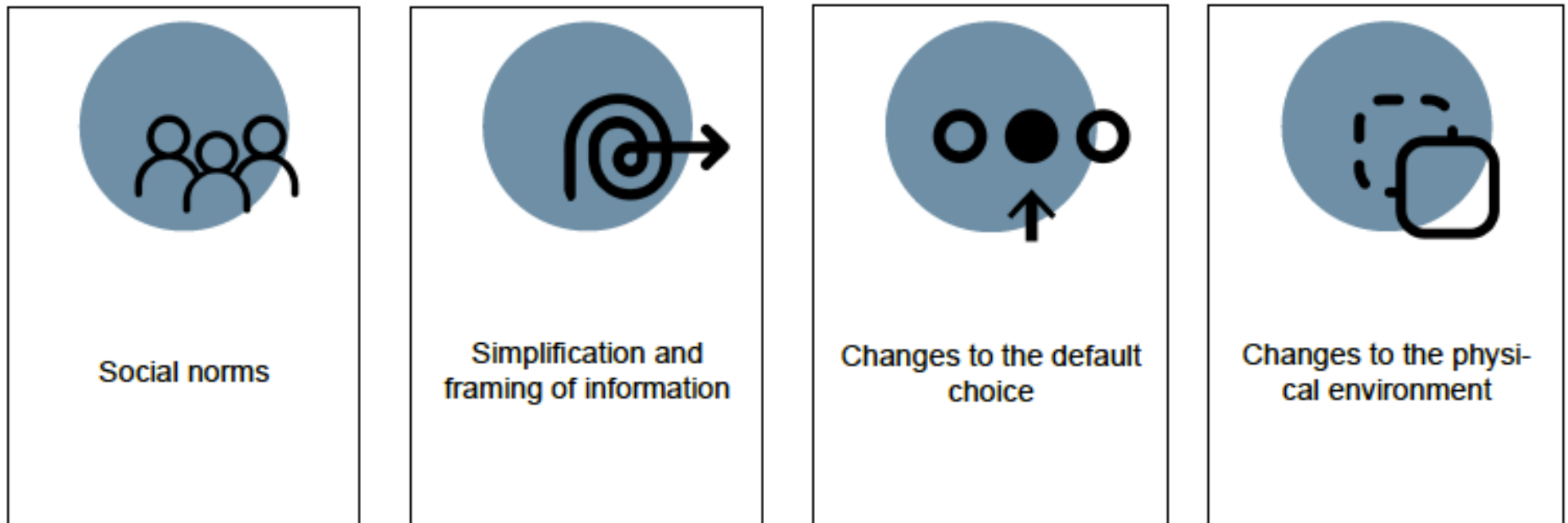


Picture 6. Idea cards for electricity and water – used to develop the final design proposals

5.6. Methods used in the design phase

Drawing on the method of Participatory Design (Simonsen & Robertson, 2012), the intention has been to make a workshop with the households, in which the households would be an active part of developing the final design proposals, aiming to minimise their electricity and water consumption in their homes. However, due to the conditions and restrictions ('staying at home' and 'social distancing') of Covid-19 this was not possible. Therefore, the design process has been conducted based on my analysis of the identified inspirations and ideas gained through the households' diaries. To support the design process, four selected nudging tools have been drawn on (presented in section 8.1) along with the households inspirations and ideas (presented in section 5.5.). Similarly to the inspirations and ideas which have been translated into inspiration and idea cards, the four nudging tools have also been made into nudging tool cards (see *image 7*). Together, the inspiration, idea and nudge cards have been used to develop the final design proposals.

Picture 7. Nudging tool cards – used to develop the final design proposals



6. Design intervention

To engage the households in minimising their electricity and water consumption, a design intervention has been developed taking an explorative, experimental and qualitative research approach – drawing on the methods of Participatory Design, Living Labs and the use of ‘probing kits’. PD have been drawn upon to emphasise the mindset of actively involving the users in the design process whereas Living Labs have been used as the concrete method to engage the users in their contextualised real life settings.

6.1. Participatory Design

The main element of Participatory Design (PD) is the involvement of the users in the design process. Building on Simonsen and Robertson’s (2012) expression; *“If we are to design the futures we wish to live, then we need those whose futures they will be to actively participate in their design”* (Simonsen & Robertson, 2012, pp. 1). PD is about the shaping of future situations and enabling the participation of those who will, in the future, be affected by their results. PD can be defined as a process of investigating, understanding, reflecting upon, and supporting mutual learning between the users and the designers through a reflection-in-action (Simonsen & Robertson, 2012).

In this project, the residents are viewed as experts of living in their homes. To get an insight into the households daily routines in their home, as well as making them reflect upon their taken for granted practices, they will be actively involved in the design process through a design intervention that will take the form of a Living Lab setup. In the Living Lab the residents will be given a probing kit which is a participatory design tool to engage ‘non-designers’. The Living Lab approach will be elaborated on below.

6.2. Living Lab

The most prominent contemporary examples of Living Labs are found within the field of commercial product development. However, Living Labs are increasingly gaining relevance within the field of sustainable transition. The different fields in which Living Labs are applied have resulted in Living Labs being referred to in different ways, i.e. Commercial Living Labs, Urban Living Labs, Living Labs for sustainability (Evans & Karvonen, 2011) and Sustainable Living Labs (SLL) (Keyson, 2017) etc. In this thesis no distinction will be made between the different types of Living Labs and it will be referred to as, Living Lab.

The concept of Living Labs blurs the distinction between laboratory and field, inside and outside and controlled and uncontrolled experiment, by engaging users in a real-life experiment (Evans & Karvonen, 2011). Living labs are user-driven and provide an opportunity to engage participants in a sustainable living environment, while understanding the implications of their daily routines and activities. A Living Lab can be characterized as a user-centric and contextualized innovation process in which the design is situated in real-life. There is a focus on behavior and experiences of daily life practices and it involves socio-technical dimensions of practices (Keyson, 2017).

In this project the residents will be involved in their contextualised, real-life setting of their homes, through a Living Lab setup, with the aim of both challenging and getting an insight into the households everyday practices related to their energy consumption. Usually Living Labs involves large scale and longitudinal setups (Keyson, 2017). However, due to the scope, and limited time frame of this project, the Living Lab involves a small and short-term setup. The Living Lab will take place over five days, spanning from Wednesday to Sunday taking place in people’s own homes. Both reflecting the time frame, as well as the

design strategy of the Living Lab, the Living Lab setup has been named ‘The 5 Day Challenge’.

6.3. Inspiration and delimitation

Involving the users through a Living Lab Design and using a ‘challenge kit’ to make the users reflect upon their practices has been inspired by the ENERGIZE project (Jensen & Friis, 2019) and the Presence Project (Gaver, Dunne, & Pacenti, 1999). I was inspired by the Living Lab approach because it provides a space for involving the users in their everyday natural context. The challenge kit inspired me to provide the households with material objects as a means of challenging their taken for granted practices. Also, the Presence Project (Gaver, Dunne, & Pacenti, 1999) in which elderly people were given disposable cameras to provide inspirational material to designers inspired me to enquire (ask the households to take pictures with their smartphone) and provide the households with material objects (in the form of diaries) to generate inspirational material from the challenges.

Households heating and laundry practices have been widely studied and challenged through a practice oriented Living Lab approach (Gram-Hanssen, 2013; Jensen & Friis, 2019). Also, the electricity consuming practices of ITC’s have been studied and challenged through visualisation methods (Gram-Hanssen & Gudbjerg, 2006; Jensen & Friis, 2019). Therefore, this study has directed its attention towards other areas of households energy consuming practices, e.g. those related to *electricity* and *water consumption*, excluding the energy consuming practices of laundry and ICT. Following the focus on electricity in this study has been identified to include: *the use of electrical kitchen appliances* and *lighting*, representing on average 13% and 12% respectively of a household’s electricity consumption. (Gregersen, 16, January, 2019).

The focus on water consumption builds on statistics revealing that the Danish households consumption account for 65 % of the purchased water, with showering and personal hygiene, and toilet flushing accounting for the two largest areas of water consumption (Gregersen, 16, January, 2019). Therefore special attention has been directed towards water consuming practices of showering and toilet flushing, but also water consumption from both the tap in the kitchen and the bathroom has been targeted, encompassing practices of cooking, cleaning and personal hygiene.

6.4. The design intervention - a 5 Day Challenge

To make the residents aware and reflect upon the services (*electricity, water*) in their homes, a design intervention named the ‘5 Day Challenge’ has been designed. In the ‘5 Day Challenge’ the participants will get a new challenge every day that they will be asked to complete. The challenge builds on the notion of ‘breaking’ the services that are taken for granted and invisible in our everyday lives. According to Spaargaren (1997), people only notice their water consumption, when it comes out brown or in the wrong place. He argues that these moments of de-routinization are critical in enabling people to examine and assess their habits (Shove 2003).

6.4.1. The design strategies of Projection and tracing

The 5 Day Challenge builds on the design strategies of *projection* and *tracing* suggested by DiSalvo (2009). Projection and tracing are two design strategies that aim to create awareness of complex issues. Projection can be described as a representation of possible future scenarios associated with an issue, whereas tracing can be described as a way of bringing attention to the network of materials, concepts, and values that

shape and frame an issue. The purpose of projection is to make visible the possible consequences of an issue. Projection can also be used in the form of Critical Design, in which the goal is to use design to explore and expose conditions and trajectories of mainstream design. Tracing is characterized by the use of designerly forms to creatively reveal and expose the underlying structures, arguments and assumptions of an issue through engagement (DiSalvo, 2009).

Although the two strategies differ in that *tracing* focuses on looking back and that *projection* focuses on representing possible futures, the 5 Day Challenge, to some extent, takes use of both the strategies. The strategy of projection is used in terms of 'breaking' the services that the residents are used to having and in this way creating a future scenario, with possible future consequences. The challenges also to some extent take the form of Critical Design in that they challenge the conditions of mainstream energy consumption. Especially the challenge of asking the residents to flush their toilet with a bucket can be considered a Critical Design for some people. The strategy of tracing is used in terms of bringing attention to the underlying invisible networks making the services available. The challenges and brief 'messages' on each of the challenge-cards brings attention to the invisible networks, and infrastructures like the electrical grid, pipes and material appliances, making different household services possible.

Disturbing the infrastructural elements and the use of material appliances of the households means that 'The 5 Day Challenge' targets the two bottom quadrants of the COWOP wheel (infrastructure' and 'near materiality') to create change in the two top quadrants of the COWOP wheel ('societal structure' and the 'individual').

6.4.2. Probing kit

To enable the participants to complete the challenge in the best possible way, all the participants were equipped with a 'probing kit' containing all the necessary materials to complete the challenge. Probing kits is a design tool to engage non-designers in specific participatory design activities. Providing users with inspirational probing kits has the ability to produce inspirational material for the designer (Sanders, Brandt, & Binder, 2010). Further, the probing kit can be viewed as an interestment device (Akrich, Callon, Latour & Monaghan, 2002). Interestment devices are identified as non-human elements which are circulated by key actors in order to inspire other actors to support the change. Interestment devices may take the form of a wide set of objects, offering various potential ways of 'making actors move'. Interestment devices provide political, symbolic and moral guidance and interpretations as well as opening up for interpretive flexibility, allowing for networks of human and non-human actors to be created and stabilized (Hansen & Clausen, 2017). As such, the probing kit has been used to both challenge the participants, get a better understanding of the households' practices and to provide inspiration for generating a future design concept.

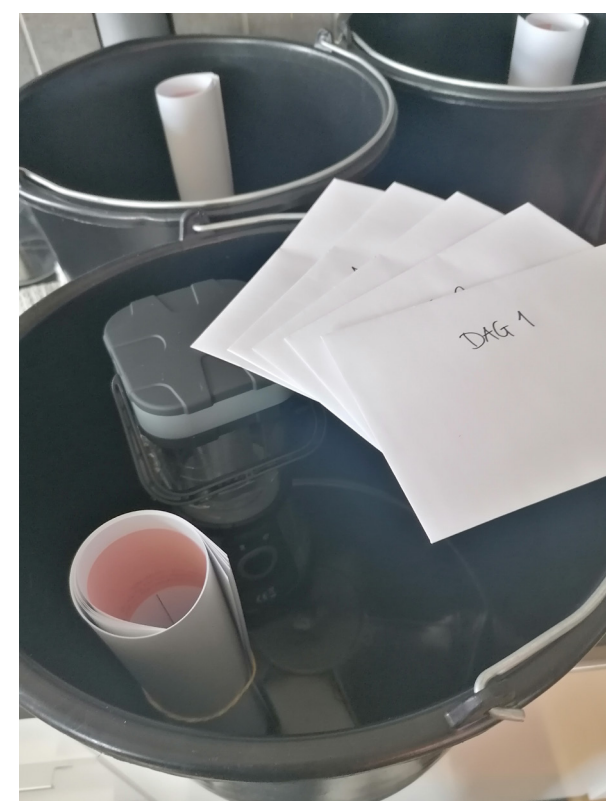
The materials in the probing kit are listed below (see also, picture 8,9 &10). Along with the probing kits being delivered to participants, they will get an introduction to the materials and their use.

- » 12l bucket
- » battery-driven lamp
- » diary templates - one for each day
- » envelopes with challenge-cards inside

Picture 8. Showing the lamps, buckets, diaries and envelopes



Picture 9. The kits given to the two households in week 14.



Picture 10. The kits given the three two households in week 13.

All the material objects in the probing kit aims at provoking the residents to reflect upon the role that available services play in their household consumption. The probes provide a means of questioning and destabilizing the existing networks of the residents' household consumption. Whereas the challenge-cards, the bucket and battery-driven lamp are enabling reflection-in action, the diary has the purpose of enabling reflection after the challenge is completed.

6.4.2.1. Challenge-cards, bucket and battery-driven lamp

The 5 challenge cards each involve a daily challenge of 'breaking' one of the residents services along with a short 'message' to the residents explaining why the service is inaccessible from their utility company. The challenges have been adjusted slightly in between the 3 weeks that the research took place, based on feedback from the households. The challenges included the following daily challenges (see picture 11 & 12):

1. *No-water-in-the-kitchen challenge*: The rest of the day, you are only allowed to use water from your bathroom. Use the bucket that followed in the kit to fetch the water.

2. *Low-water-pressure challenge*: For the rest of the day you can only turn on the water on half the pressure than you normally do (*adjusted from only applying to the shower in the first week*)

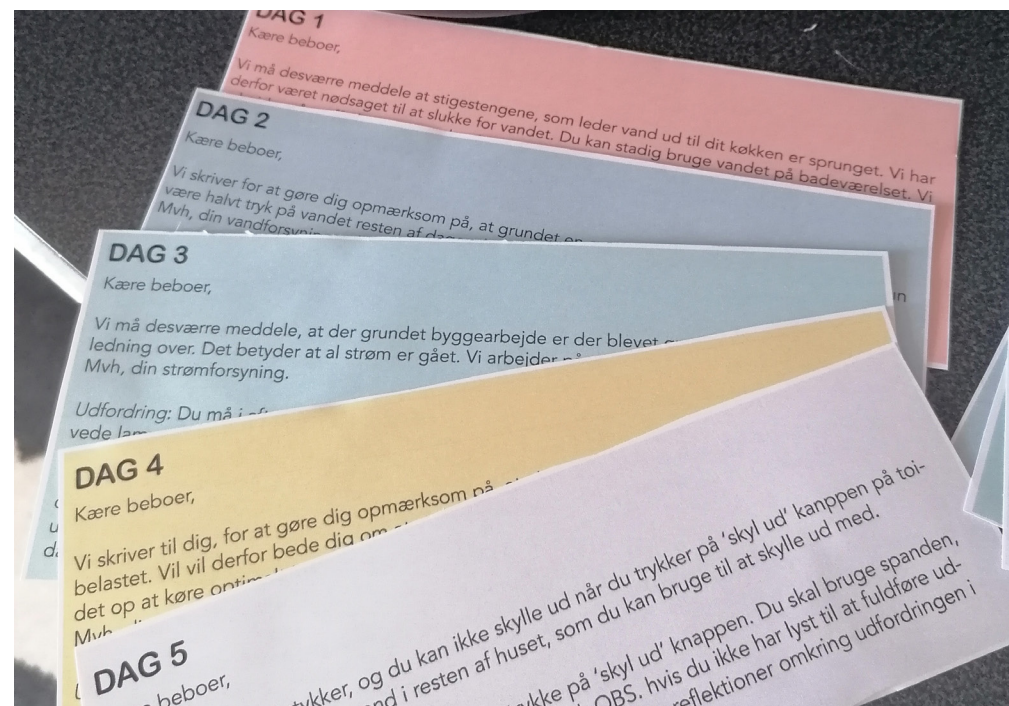
3. *No-electrical-lights challenge*: This evening, you are not allowed to turn any lights on in your home. You can use the battery-driven lamp that followed in your kit. You can bring it along with you, into the different rooms that you are staying in

4. *No-electrical-kitchen-appliance challenge*: You are not allowed to use any electrical kitchen appliances for the rest of the day (*adjusted to giving an elaboration on what was meant by electrical kitchen appliance*).

5. *No-using-the-toilet-flush-button*. You are not allowed to flush the toilet by using the 'flush' bottom. You need to fill water in the bucket that followed in your kit, to flush the toilet with.

In consideration of not crossing any of the participants boundaries, it was clearly stated in all 5 challenge-cards that the participants were free to, not complete the challenge, if they did not feel like it. In this case, they were merely requested to write down their reflections about it instead.

Picture 11. The challenges printed out



Picture 12. The 5 daily challenges

DAY 1

Dear residents,

Due to maintenance of the risers in your kitchen, the water has been temporarily turned off. You can still use the water in the bathroom. We are working on fixing the problem as soon as possible.

DAY 2

Dear residents,

We are contacting you to make your water pressure in your apartment work on fixing the problem as soon as possible. Best regards, your water company.

the bathroom (you can use the water in the bathroom).

DAY 3

Dear residents,

Due to construction work in your area, an electrical wire has been cut in two. This means that we are working on fixing the problem as soon as possible.

DAY 4

Dear residents,

We are contacting you because of a power outage for a few days. We kindly ask you to be a bit patient and use the full grid capacity, as soon as possible. Best regards, your electricity company.

Challenge: You can not use any electrical appliances if you have an electrical stove, you can not take a picture with your smartphone. If you do not feel like completing the challenge, you can skip it and merely write down your reflections of the challenge in your diary.

DAY 5

Dear residents,

Your toilet is broken. You can not flush the toilet when you push the flush bottom. However, there is still water in the rest of your apartment, that you can use to flush the toilet with.

Challenge: You can not flush the toilet, by using the flush bottom. You need to use the bucket that followed in your kit to flush the toilet. You can do this by filling water into the bucket and pouring it into the toilet. Please note; If you do not feel like completing the challenge, you can skip it and merely write down your reflections of the challenge in your diary.

6.4.2.2. *Diary templates*

In the diary the residents were asked to use 5 min. on writing down their reflections everyday. To make it simple for the participants, the diary contained predefined questions such as; *Did you succeed? Was it difficult? Were you surprised? Did the daily challenge affect the way you would normally spend your evening? Did the daily challenge affect any of your other routines in your home? etc.* The questions differed slightly from day to day, so they fit with the specific daily challenges. To make room for the reflections that could not be captured by the predefined questions, the diary also included a 'Other reflections' category. Further, In the bottom right corner, a little box was provided for any ideas the participants might have gotten, when completing the challenge (see *picture 13*). To document the challenge, the participants were asked to take a picture of their challenge situation every day, with their smartphone. The reflections from five of the diaries have been translated from danish to english (one was originally written in english). This might entail that some of the meaning might get lost in the translation. Nevertheless, efforts have been made to translate the meaning.

Due to Covid-19 it was necessary to take special precautions in relation to entering the physical objects of the probing kit into people 's homes as I did not want my research to cause anyone to potentially get infected by participating in the research. The precautions taken implied disinfecting all surfaces used to prepare the kits and disinfecting the objects in the kit. When recruiting the households and when delivering the probings kits, the households were informed that the kits were disinfected, but they were still encouraged to disinfect the kit again before use. Also, the probing kits were delivered either outside or at the doorstep (keeping a distance).

Picture 13. The diary templates

DIARY: DAY 5

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your

DIARY: DAY 4

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your

DIARY: DAY 3

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your

DIARY: DAY 2

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your

DIARY: DAY 1

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

Were you surprised about the amount of water you used?
Did something else surprise you?

Did the daily challenge affect any of your other routines in your home?

Other reflections?

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

Did the daily challenge affect the way you would normally cook/take the dish, etc.?

Ideas? If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.



7.

Insights from six households' electricity and water consuming practices

This chapter will first introduce the insights gained from available data on the performance gap of BOLIG+ revealing whether a performance gap is present in buildings labeled as sustainable. Next, the insights gained from the design intervention, exploring into households everyday practices will be presented and analysed.

7.1. The performance-gap in BOLIG+

A measurement and evaluation of the zero energy apartment building BOLIG+ conducted by SBI in 2018, show that the measured yearly consumption of heating was a little higher than expected while the electricity consumption in the apartments was much higher than projected and electricity produced from the solar panels was much lower than projected. The reason for the heating being slightly higher than expected is due the rooms being heated with an average of 22,8 degrees rather than the projected 22 degrees (which is already higher than the usual 20 degrees that is usually calculated with). It is also shown that there is a big variation between the apartments heating consumption, which is attributed to the placement of the buildings, user behaviour and excess heating from the use of electrical appliances (Jensen, Wittchen & Knudsen, 2018).

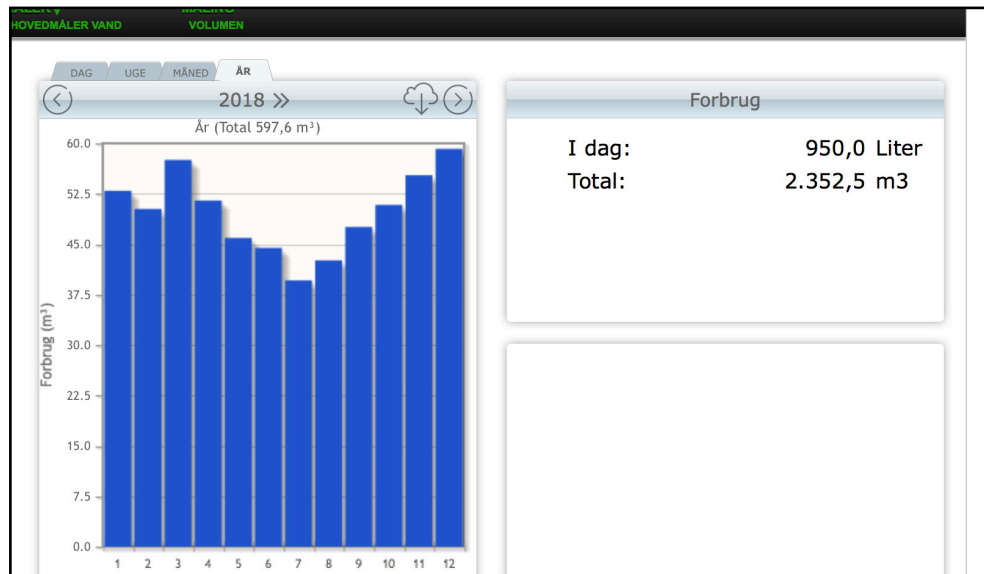
The measurement of the electricity consumption showed that only two of the apartments had an electricity consumption that was lower than projected while the rest of the apartments had an electricity consumption that was between 26 - 150% higher than expected, resulting in the average yearly energy consumption per household being 2.480 kWh. (or 45% higher than expected). The report shows that the calculated electricity consumption includes the energy used for; the building's ventilation system, some extra monitoring equipment and energy used by one apartment to charge a battery driven car which needs to be

subtracted from the household's energy consumption. After subtracting this energy the apartment's electricity consumption was on 2049 kWh per household which is about 20% higher than projected (Jensen, Wittchen & Knudsen, 2018).

However, it is revealed in the description of the ventilation system that the apartments are equipped with individual ventilation systems which the residents can control from their apartments, rather than having a centralized system. The ventilation systems are equipped with an electrical heating surface which the households can increase if they want, ensuring a higher level of comfort in the apartments. Also, the households can 'turn off' the ventilation systems during the summer and ventilate their apartments by opening the windows instead (Jensen, Wittchen & Knudsen, 2018). Considering the amount of influence the households have on controlling the ventilation system it can be discussed whether some of the electricity used for the ventilation system should actually be viewed as household consumption.

As the measurement and evaluation of BOLIG+ conducted by SBI does not conclude on the buildings water consumption, data from the buildings energy management system eviShine has been obtained. The data from eviShine measuring the water consumption at BOLIG+ reveals a yearly water consumption of 597,8 m³ in 2018 (*see figure 2*). This means that BOLIG+ had total yearly water consumption equal to 597.800 liters (*see calculation below*). Given that 18 residents (17 grown ups and 1 child) lived in BOLIG+ in 2018 (Jensen, Wittchen & Knudsen, 2018), it means that the residents have a average water consumption of approximately 90 liters per day (*see calculation below*).

Figure 2. A measurement of BOLIG+ water consumption in 2018, from the energy management system eviShine



Calculation:

$$597,8 \cdot 1000 = 597.800 \text{ liters/year}$$

$$597.800/18 = 33.211 \text{ liters/person/year}$$

$$33.211/365 = 90,98 \text{ liters/person/day}$$

This reveals that the average water consumption in BOLIG+ is below the consumption of the average danish person who uses 103 liters per day (Awad, et. al 2018). Thus, a performance gap is revealed in the electricity consumption of BOLIG+, but not in the water consumption. The reason for why this is, is not clear from the data presented above.

Whereas this section has looked into the actual performance of BOLIG+, the following section will look more into the six households everyday practices that indirectly leads to the households electricity and water consumption.

7.2. Reflections from the design intervention

The insights from the design intervention have been divided into eight themes in which the first six themes have been applied, attempting to let the households' reflections speak for themselves. The last two themes apply a more theoretical understanding of the households practices.

7.2.1. Habits and routines

Although the households in general succeeded in completing the challenges, the reflections from the diaries reveal that it was difficult for households to complete the challenges without making 'mistakes'. The majority of the households turned on the water by accident in the no-water-in-the-kitchen challenge. Also some of the households accidentally turned on the water using full pressure in the low-water-pressure challenge. The majority of households similarly turned on the lights by reflex in the no-electrical-lights challenge and one of the households turned on the coffee machine a few times during the no-electrical-kitchen-appliance challenge. Finally, some households flushed the toilet as a reflex on no-using-the-toilet-flush-button challenge. The man living at SHV explains that he instinctively turned on the lights several times although he was holding the battery-driven lamp in his hands. The woman at BOLIG+ explains that: *"A lot of my energy consumption lies in my routines/reflexes and it is not something I think about - even though I think that I'm aware of my consumption"*. Also, though the household at FBG made their own little nudge to remind themselves not to use the tap, by placing the bucket filled with water next to the sink they still state: *".....there were many times that we were suddenly about to open the water tap"*. It is interesting to notice that the households use different ways of expressing their routinized practices as: automated,

reflex-based, routinized, instinctive and as *"it lies in the hand"*.

This bodily aspect of e.g. turning on the lights by reflex can be seen as consistent with Shove et al.'s (2012), view that the body itself is as a part of the material element of a practice. The different challenges reveal that it is difficult for the body not to perform what it has 'learned'.

7.2.2. Invisible services

The intervention shows that many of the services that the households have are 'invisible' and taken for granted. This is expressed by the household of JVK: *"I usually just press a button. It is easy and I don't think about the underlying things. Like the toilet filling water into the toilet again, which I had to do myself in the challenge"* or the household at BOLIG+ reflecting upon what kitchen appliances mean for them in the everyday: *"It means a lot, but is taken for granted"*. The woman from JVK expresses that filling water in the bucket really made it visible for her how much water it takes to flush the toilet every time. Further, the household at Urban Rigger reflects that the challenge also made them think about the things that take place behind the *"wall"* in connection to how the water is going back into the sewer system. This indicates that the challenge made them think about the underlying technologies and systems that make it possible to flush the toilet but merely pressing a button. The invisible service is also revealed as BOLIG+ used their coffee machine several times during the no-electrical-kitchen-appliance challenge, they explain that they forgot that it was an electrical appliance. This shows how the household is not thinking about the underlying resources (electricity) making the service possible in everyday life. Moreover, in the no-water-in-the-kitchen challenge some of the households explain that they were surprised about how many times they had to go and fetch water. JKV explains it as: *"Were surprised by how many*

times we had to go to the bathroom to get water for little things that they usually wouldn't have noticed". BOLIG+ expresses that though they earlier have considered themselves as aware of their consumption (since they have a system in which they can monitor their consumption on a daily basis), they noticed how much they consume without being aware.

The findings above are consistent with Shove's (2003) findings showing that services are invisible and taken for granted. The insights from the design intervention show that by 'breaking' these services which the households are used to having available, the underlying rules, resources, technologies that are a part of constituting the practice is brought to forth (Shove, 2003). This especially becomes clear as the household at JVK refers to the *"...the underlying things"* that makes it possible to flush the toilet or when Urban Rigger refers to the infrastructure connected to flushing the toilet as *"the things that take place behind the wall"*.

7.2.3. Becoming aware

It appears that the households became more aware of the invisible services connected to their energy consuming practices during the 5 Day Challenge. By the end of the 5 Day Challenge, many of the households express that they feel grateful and privileged that they can merely press a button to flush the toilet. The man living at SHV reflects that: *"The fact that you can just push a button, makes you think about how privileged we are"*. This reveals how the service is no longer taken for granted but is more appreciated after it has been made visible. The couple at Urban Rigger express that: *"...we both are surprised we haven't done this before! Makes sense to use less water pressure in general"*. They reflect that they have become aware that using full pressure for some things

is a waste of water and that they will continue to use low water pressure, especially for brushing their teeth and showering. The at SHV also expresses that he has become more aware that using full pressure for small things like rinsing a vegetable or a plate is unnecessary. Similarly, the household at JKV reflects that the challenge made them realize how much unnecessary water there is coming out of the tap or showerhead, in many situations and that there is a lot of unnecessary water this way. The couple at FBG explain that they have become more aware about how important it is to have water in the tap in the kitchen and how easy it makes their everyday life. Many of the households also express that they were surprised about how many lights they left on in rooms that they were not staying in and that it has made them reflect about their energy consumption.

These reflections of becoming aware and feeling grateful supports Spaargaren's (1997) argument that – people only notice their water consumption, when it comes out brown or in the wrong place and that these moments of de-routinization are critical in enabling people to examine and assess their habits.

However, in some cases the challenges also revealed that some of the households do not want to think about or be aware of their energy consumption. This can be seen in the household at PLG, in which the woman does not want to settle with less comfort. In relation to the amount of water she uses on bathing, she reflects that: *"In relation to this, I don't want to be aware (it's a luxury)"*. During the water-on-half-pressure challenge the household at FBG expresses that: *"We live in a Zero-energy house and the consumption is already taken into consideration. We like that, then we don't have to think about it"*. This reflection also reveals a tendency of 'letting the technology fix it for you' which also becomes visible in that they bring the idea of implementing

a system in which lights turn off automatically after 10 minutes that no one has been in the room.

7.2.4. Convenience and comfort

Although the households express that they have become more aware of their household consumption, the reflections also reveal that it is not easy for many of the households to decrease their level of comfort. In the no-water-in-the-kitchen challenge BOLIG+ did not clean their coffee machine because it would have been a big deal to move it out on the bathroom to clean it. Also they chose solutions that did not involve using water from their household, like ordering food from outside and drinking soda and juice instead of tap water. Also in the no-electrical-kitchen-appliance challenge they decided to order food from outside. Urban Rigger, FBG and JKV all decided to leave the dishes for the next day during the no-water-in-the-kitchen challenge. FBG notes: *"the kitchen was significantly more messy and the dishes were left until the day after!"*. This shows that the households did not find it convenient to decrease their comfort in relation to these practices, but would rather wait until they had usual services available again. However, although the man living at SHV also did not find the challenge convenient he took a more practical approach to the challenge. This can be seen in his reflection: *"It was not cool to wake up to a tap that does not work! Sh*t sh*t sh*t! Buut....water from the bathroom is also made into coffee"* and also as he still both cooked and took the dishes in a bucket rather than leaving it to the day after.

Most of the households referred to it as annoying and time-consuming to use the water-on-half-pressure challenge. BOLIG+ thought that it was more difficult than the no-water-in-the-kitchen challenge because everything took longer time. Although the woman at BOLIG+ still

Picture 14.
The dsihes
left out at
FBG



Picture 15.
The dsihes
left out
at Urban
Rigger



Picture 16. Low water pressure at Urban Rigger



showered, she did not wash her hair with shampoo, because she did not have the energy to rinse the shampoo out on low pressure. She explains that they deliberately exchanged the water saving function in their showerhead because they wanted full pressure on the water. The man at SHV also points to the inconvenience of rinsing out the shampoo with the water being on low pressure. He explains: *“It was not difficult but it took longer to, e.g. get the shampoo out of the hair”*. The household at FBG, on the other hand, did not find it difficult to shower with the water on half pressure, because their shower-head was already based on low pressure technology. Nevertheless, they express that they had to get used to the low pressure in the beginning when they moved into the building. Furthermore, the household at FBG, explained: *“Yes it was a little annoying to fill your glass of water on half pressure when you know it can be done faster”*. The relation between the amount of time and the amount of water used is also reflected in JKV and SHV as they reflect that for rinsing a plate or vegetables it is fine to use low pressure, because it is a waste of water to use full pressure. PLG also proposed the idea of making different functions on the tap in the kitchen, including for example a ‘rinse vegetable’ function (low pressure) and ‘fill pot function’ (high pressure).

The insights revealing that the households find it more annoying to use low water pressure when they know that it is *possible* to be done faster, is consistent with Shove (2013) who suggest that the growing consumption should be seen as a consequence of societal processes, such as changing social norms and expectations, following from new technical *possibilities*. Mortensen (2020) also discusses how the aspect of how ‘having the opportunity’ affects people’s practices. She gives the example of moving from an old building into a modern building – in the modern building it becomes possible to get a comfortable temperature

that is 2 degrees higher, because the building is well isolated. She argues that as long as the opportunities are there they need to be taken into account when calculating the buildings performance.

7.2.5. Cleanliness

The households’ practices of cleanliness becomes visible in relation to the three water challenges. On one hand, some of the reflections from the diaries show that the challenges might have affected the households’ practices to be less hygienic than usual. The households’ less hygienic practices are first of all reflected in that many of the households leave their dishes to the next day. Furthermore, the household at PLG reflects upon their cooking practice as less hygienic than usual. As I went to fetch their diaries, they further explained that they did not rinse all the vegetables as they normally would have and they did not wash their hands as frequently as usual. Also, as already mentioned earlier, although the woman at BOLIG+ still showered she did not wash her hair with shampoo, because she did not have the power to rinse the shampoo out on low pressure. This shows that some of the households were willing to give up on some of their practices of cleanliness when it was inconvenient. However, for most of the households it meant giving up on small things like leaving the dishes for the next day, which might have occurred anyway on occasion and it can also be seen as connected to challenges lasting only one day and the households knowing that it was a lab. The household at JKV explains it as: *“It wasn’t that hard because it was only one day. [...] But if it had been longer then we would be forced to take the dish...”*.

On the other hand, the importance of practices of cleanliness are still performed and reflected upon in many of the households related to the different challenges. First, it is reflected in that most of the

households still shower, *with or without shampoo* in spite of the low water pressure. The household at PLG explains that getting a shower was more important than having to take it on low pressure. Furthermore, in contrast to the household at PLG, who slacked a little on their hygiene while cooking in the no-water-in-the-kitchen challenge, the importance of cleanliness becomes clear in the household at SHV. The man from SHV takes many trips to the bathroom while cooking, to rinse vegetables and wash his hands after touching meat and eggs. He explains it as follows: *"All the water you use to do the cooking itself must be clean..."* and *"...rinsing a tomato, a cucumber and some salad. It resulted in many trips to the bathroom. Washing the hands when one has touched eggs or meat -OCD!!"*. Additionally, he notes that he did not like the idea of the bathroom potentially smelling bad when he had to rinse a tomato.

In the no-using-the-toilet-flush-button challenge, the household at Urban Rigger decided not to complete the challenge entirely. In their own words they decided to flush when they *"...both went to 'defecate'"*. They used the bucket to flush when they pried and they refer to it as *"...an experience"*. Further, the man at SHV thinks that he used more water this way, because he filled the bucket all the way to the top, to make sure to flush everything in the first try. This example brings out the importance of competences which Shove et. al. 's (2012) note is the practical knowledgeability required to perform a practice. It can be seen that the man at SHV is not used to flushing the toilet by using a bucket and thus does not know exactly how much water it takes.

7.2.6. Influencing practices

The insights reveal that during the 5 Day Challenge the households have changed the way they normally cook, shop, wash dishes and spend their evening. The no-water-in-the-kitchen challenge can be seen as chang-

ing the households' normal practices in that many of the households changed their diet by ordering food from outside instead of cooking at home and waited to take the dishes the day after. Also, the household at Urban Rigger explains that: *"It was alright, although it limited our food options. We tried to eat as simple as possible to avoid the "trip" to the toilet [...] or having too much to wash afterwards"*. Further, the no-electrical-lights challenge also affected the practice of cooking at FBG. The man in the household explains: *"The most difficult was preparing the food. The lighting was really bad and my mood was really affected by it"*. The household at Urban Rigger reflects that the no-electrical-kitchen-appliance challenge would definitely have affected the way that they normally cook if they had completed the challenge, but since they still used some electrical appliances it did not affect their routine so much. The household at JKV explains that they forgot about the no-electrical-kitchen-appliance challenge when they went to shop for dinner. During their shopping they had shopped to make hummus which resulted in them using their blender anyway, since they had already shopped for it. This reveals that availability of water, lighting, electrical kitchen appliances, grocery shopping all had an effect on the households eating and cooking practices.

Some of the challenges also affected the social aspect of having friends over. The household at JVK were considering having a friend over to study. However, due to not having water in the kitchen they did not have the friend over anyway. The woman of the household explains, *"It was mostly me that felt uncomfortable having him over and bringing him water from the bathroom. My husband did not mind so much, he would just tell him we had a challenge"*. The man living at SHV on the other hand, did not mind having a guest over in the no-electrical-lights challenge. However, as he understood the challenge as also not being



Picture 17. The man at PLG filling his pot in the bathroom



Picture 18. The man at PLG having the battery-driven lamp on in his kitchen



Picture 19. The man at JKV cooking with the battery-driven lamp on

allowed to turn on the television, his practices changed, because he had a guest over that he had to be more social with.

The way the household at JKV spent their evening was also shaped by the no-electrical-lights challenge. The woman explains that she made a puzzle which she had to stop, because it became dark and the battery-driven lamp did not provide enough light to continue the puzzle. Instead her and her husband participated in a silent disco event that was taking place on their street that evening (from their balcony). She reflects that if she had been able to turn on the lights she would probably have continued with the puzzle and not participated in the silent disco event. However, they were happy that they were pushed out of their normal routine and participated in the event, since they had a really good evening. The challenge also affected the way the family at FBG spent their evening. The parents explain that they let their child have the lights on in her room which resulted in her staying in her room playing all evening, instead of being with the parents in the living room (which she would usually have been much of the time on a normal evening). In this way the parents got some 'alone' time, in which they enjoyed listening to a book which they would normally not have had time to do. The household at PLG, on the other hand, did not feel like their way of spending their evening changed so much because they watched Netflix anyway, which they do very often.

7.2.7. The social construction of needs

In line with Gram-Hanssen (2013) who finds that the higher levels of comfort related to a growing number of appliances should be understood as a consequence of societal processes, such as changing social norms and expectations following from new technical possibilities, this intervention reveal that the majority of the households are not able to

manage without electrical appliances in their everyday lives and that they have become dependent on them. This can both be seen in that the majority of households deliberately decided to use some of their electrical appliances (however, still minimizing the use of electrical kitchen appliances), and in the discourse they have about the challenge. The woman of JKV decided to use her blender to make hummus, as she had already shopped for it. She explains, *"We use the electrical kettle, toaster and juicer very often. And yes, it turned out that we couldn't manage without the blender"* and following she adds, *"... you get used to having these things in the home...and you organize your day around having these luxury appliances, in a way that you suddenly can't live without"*. The household at Urban Rigger also decided to use their blender and kettle to make smoothies and tea, since these two things were a part of their daily routine that they could not give up on.

Especially in relation to the coffee it is revealed that there is a need of preparing one's coffee in a specific way, which involves using an electrical grinder to grind the coffee. This can be seen in that coffee was mentioned in nearly all the diaries except for Urban Rigger. Although the man of the household at FBG thinks of it as a little unnecessary to have an electrical coffee grinder, since it could be done in the hand in nearly the same amount of time, he still expresses that: *"It would probably have been annoying without the coffee grinder"*. Further BOLIG+ refers to it as a challenge not being able to use electrical appliances to make the coffee. Especially, the household at PLG would not give up on making their coffee as they used to. They decided to use the coffee grinder anyway and also sent me pictures of their freshly grinded coffee, with the coffee grinder next to it. In the pictures they even took the time to add a humorous text saying, *"Here goes the limit"* and *"Don't f*ck with our coffee...Cafe noir - blackout humor"* (see picture 20 &



Picture 20. Showing two cups of coffee with the coffee can behind – stating a humorous text about black coffee

Picture 21. Showing two cups of coffee with the electrical grinder behind at the households at PLG – stating 'Here goes the limit'



21). Although the pictures were meant to be funny (as there were two 'crying from laughing' emojis afterwards), it still shows how important it was for them to make the coffee as they used to. When asked about the text saying 'black out humor' they referred to commercials made by Cafe Noir that ended out by stating "*Synes du det her er sort? Så skulle du prøve Cafe Noir*" (translated: "*Do you think this is black? Then you should try Cafe Noir*"). The direct translation of dark humor from Danish to English is 'black humor'. Similar to Crosbie and Guy (2008) who suggest that lighting choices tend to co-evolve with the household lighting practices portrayed in the media, the following text indicates that media might also have an effect on the social practice of drinking coffee in a specific way.

The social construction of norms can be seen in the differences between the grown up and the child at FBG and how they approach these differences. Reflecting Graham-Hanssen's (2007) study on teenage consumption of cleanliness revealing that practices of cleanliness are being passed on from parents to children, the following study reveals that parents at FBG are teaching their child about clean and dirty water. At first the child thinks that it is disgusting to drink water from the bathroom which meant that the parents had to have a conversation with her about what is clean and what is dirty. The parents elaborate that: "*It was fun to be able to talk with our daughter about the challenge which was a challenge in itself :)*". On the other hand, in the last challenge of no-using-the-toilet-flush-button, the child thinks that it is funny to flush the toilet by using a bucket. This indicates that the child does not have the same sense of discomfort as some grown-ups show by not being able to flush the toilet. Graham-Hanssen's (2007) also reveals that it is especially as the children become teenagers that they are being socialized into performing practices of cleanliness related to showering and

not smelling bad. This could provide an explanation for why the child in the age of eight does not think of the challenge as disgusting or uncomfortable as she is still not socialized into having these practices of cleanliness.

7.2.8. The symbolic meaning of practises

The symbolic meaning of practices are illustrated as the woman at PLG explains that the challenge affected the way that she usually showers. For her showering is more than an act of cleanliness. She writes as follows: "*I don't only shower to get clean, but also for warmth, coziness ('hygge') and relaxation*". Because of the low pressure, the length of the shower was shortened and it became more functional. Also the evening shower was cancelled, as it was not appealing. She further reflects, "*In relation to this, I don't want to be aware (It's a luxury)*". Also, the man at SHV, did not want to take a shower for enjoyment ('hyggebad'), because of the low pressure. He also adds that if he had a bathtub, he would not fill it that day. These insights are consistent with Shove's (2003) findings revealing that bathing can among other things be related to personal pleasure and luxury, associated with long lingering baths as well as, rapid showering related to the obligation associated with waking up and getting ready for a new day, this symbolic meaning of bathing is also reflected in some of the households.

Especially during the no-electrical-lights challenge the meaning that is given to illuminating the home is revealed. For some households the missing light was associated with a good and cozy atmosphere while for others it was associated with a bad and depressing mood. The man at FBG explains that the most difficult thing about not having regular lighting was preparing dinner. The man in the household explains, "*The lighting was really bad and my mood was really affected by it*" and

"I was surprised that my mood became so bad". On the other hand, the man living at SHV, referred to the challenge as, *"...very cozy"*. He explained that his lighting consisted of the lamp (battery-driven) and two candle lights, which created a cozy environment. However, it was still fine with him that it only lasted one evening. The household at PLG also thought of the lighting challenge as cozy, and commented that they are used to the 'candle light life'. However, the woman notes that she would not have done the challenge if she was alone, because then she would have thought of it as depressive anxiety provoking. The woman at JKV both refers to the lighting challenge both as cozy, but also as depressing. As she explained how they lit candle lights, she referred to it as being cozy. However, later she also reflects that, *"It actually surprised me how much it meant to me that there was no light, I nearly got depressed"*. As I came to fetch the diaries, she explained that the lighting challenge made her depressed at first, but after a while she got used to it and thought that it was cozy.

The households descriptions of lighting as: *depressing*, *cozy* and *affecting the mood* support the findings from several studies which reveal that the act of illuminating the home is more than, solely, an energy consuming act (Jensen, 2013) and that it is more about attuning the right atmospheres (Bille 2019). Although Jensen's (2013) finds that connotations related to lighting and homeliness are common across households in her study, this study reveals that the households have very different experiences and connotations about coziness when using the battery-driven light. Part of the explanation might be found in the extent to which some of the households used multiple lighting appliances to create a cozy atmosphere (Crosbie & Guy, 2008). The households that refer to using multiple lighting appliances' consisting of both the battery-driven lamp and candle lights described the atmosphere as

cozy. Jensen (2017) also describes how lighting has been influenced by domestic practices such as cooking. Apart from using lighting to create the right atmosphere, a more functional dimension of having the right lighting while cooking, especially becomes apparent when the household at FBG finds it difficult to prepare the dinner without the regular lighting.

Sub-conclusion

The insights from the design intervention show that many of the households energy consuming practices lie in their routines, habits, reflexes and bodily aspects of performing their everyday practices. The services connected to electricity and water which makes the households practices possible are 'invisible' and taken for granted. However, it appears that the households became more aware of the invisible services connected to their energy consuming practices during the 5 Day Challenge. This made it possible to locate areas in which the consumption can be minimized without affecting the household practice – e.g. rinsing vegetables on low pressure. On the other hand, it also made it possible to locate areas in which the consumption can not be minimised or changed in the same way, due to the meaning associated with the practice. Those areas of consumption were especially related to the practices of showering, drinking coffee, and illuminating the home – e.g. for some of the households a short and low pressure shower would not provide the same sense of relaxation. These insights indicate that it is necessary to understand how the consumption and practice are linked before changing the practice.

The insights also reveal that convenience and comfort are strong drivers for the households practices. Although it was common across the households that they found it difficult to decrease their level of comfort,

a difference can be seen between the households, in that some of the households took a more practical approach – e.g. cooking without light, taking the extra trips to the bathroom to rinse vegetables etc. whereas other households took a more convenient approach – e.g. ordering food, leaving the dishes, using the kitchen appliances etc. Further, the insights make it visible that convenience and comfort are connected to the aspect of *possibilities* – e.g. the households found it more annoying to use low water pressure when they knew it was *possible* to do it faster, and the household at BOLIG+ removed their low pressure showerhead because the low pressure was inconvenient. These insights indicate that the aspect of *possibilities* should be considered in relation to changing a practice if it shall have the intended effect.

Furthermore, insights from the intervention reveal that practices of cleanliness differ across the households. Although all the households still showered during the low-water-pressure challenge, the households reacted differently to the other ‘water’ challenges. Some of the households were more strict about cleanliness in the cooking situation, and others in the ‘flushing the toilet’ situation whereas others were generally more relaxed about it. Although differences were revealed, the insights indicate that most households had a tendency to give up on minor aspects related to practices of cleanliness for the sake of convenience. These insights indicate that ‘one fits all’ solutions are not possible when changing household practices related to cleanliness.

Finally, the insights show that ‘breaking’ different services, affected the households practices in various ways. Whereas the water challenges affected the households practices in relation hygiene, cooking, ordering food, washing the dishes etc. the lighting challenge especially had an influence on the way the households spend their evening, and in some of the households it also had an influence on the practice of

cooking. An interesting insight gained from the lighting challenge is the strong effect it had on the households moods and also the extent to which it differed across the households – from a good and cozy atmosphere to a bad and depressing mood. These insights indicate that changing people’s practices comes with a responsibility. It is necessary to understand the relationship between the service and the practice, as well as the practice’s effect on other practices, before designing for change. The next chapter will present how the design proposals of this thesis have been developed, building on the households’s suggestions to minimize their water and electricity consumption and the use of four selected nudging tools.

8. Design phase

This chapter provides an overview of the design process that has contributed to the development of three final design proposals to support households living in buildings labeled sustainable, in minimising their energy consumption. Normally, drawing on PD, the process entails the active involvement of the users, but because of the conditions caused by Covid-19 this was not possible. Therefore, the following design process is based on my analysis of their suggestions. The chapter starts by giving a brief introduction to nudging and four selected nudging tools that I have used to support the design process. The next section describes how I have developed the solutions, based on the users inspirations and ideas identified from the diaries. Finally, I have conducted a market research on existing solutions for minimising household electricity and water consumption, to establish a point of reference for the design proposals – both to ensure that the design proposals did not already exist and to compare the design proposals to existing solutions.

8.1. Drawing on nudging tools

To support the design process, nudging tool cards have been created (see section 5.5), The *nudging-tools cards* are based on the four nudging design tools presented below:

- » *simplification and framing of information,*
- » *changes to the physical environment*
- » *changes to the default policy,*
- » *the use of social norms*

The different nudging tools have been applied in combination with the inspirations and ideas to create the design proposals. The following paragraph will highlight the main idea of nudging and describe the four

nudging tools drawn upon. Special attention will be given to the nudging tool; ‘the use of social norms’ in which social norms in the form of ‘descriptive norms’ and ‘dynamic norms’ will be introduced.

8.1.1. Nudging

Nudging is a branch of behavioural economics (BE) that, in contrast to mainstream economics, rejects the assumption of rational decision making. Behavioral science draws on cognitive and social psychology, stressing the less rational nature of peoples decision making and highlights the importance of behavioural biases in the decision context (Lehner, Mont, & Heiskanen, 2016). According to Lehner, et. al. (2016), nudges refer to intentional changes in the choice architecture that influence peoples’ behaviour by making changes in the physical or informational structure of the environment, to guide and enable individuals to make choices almost automatically. The goal of nudging is not to change people’s values or to increase information provision. Rather the focus is on promoting behaviour that is beneficial for society as well as for the individuals long term interests. Nudging takes the position that people are often unaware of how the decision environment affects their actions (due to cognitive biases and social decision making) and therefore nudges mostly attempt to change non-deliberative (automatic, intuitive) aspects of individuals actions (Lehner, et. al.,2016).

Drawing on the COWOP framework, nudging can be seen as being positioned within the individual level encompassing the elements of ‘near materiality’ and ‘the individual’, since the nudges are directed at the individual and the individuals close physical environment and technologies which are under individual control. As nudging in contrast to other individualistic approaches to behaviour change do neither seek to change people’s values or increase information provision and takes the

position that people do not act rationally it can be viewed as reflecting the social practice theoretical perspective which takes the position that consumption patterns can not be explained as linear and rational processes related to an individual's attitude, values and beliefs.

8.1.1.1. Nudging-tools

According to Lehner et. al (2016), there are four types of nudging-tools: 1) *simplification and framing of information*, 2) *changes to the physical environment*, 3) *changes to the default policy*, and 4) *the use of social norms* (Lehner, et. al., 2016). First, simplification and framing is more concerned with how information is presented than the amount of information presented. Following information needs to be presented in a straightforward and conscious way, so that it does not overload the individuals processing capabilities. Second, changes to the physical environment is concerned with the placement and availability of things in the physical environment as well as the direct altering of the environment. As an example, a study made by Pucher and Buehler (2008), shows that creating separate cycling facilities and increased parking spaces for bikes, has played an important role in increasing the rate of cycling as a means of transport in Denmark, Germany and the Netherlands (Lehner, et. al., 2016; Pucher & Buehler, 2008). Third, changes to the default policy is concerned with changing the standard choice, in case people take no action. For example studies show that organ donation is significantly higher in countries where the default option is to donate once organs, than in countries in which it is an active choice. Finally, the use of social norms are viewed as strongly influencing human behaviour, since humans are social beings. Thus, the importance of social norms is something that both PT and BE points to. When using social norms to influence behaviour, the norm must be salient and visible for the individ-

ual. A study made by Goldstein, Cialdini and Griskevicius (2008), shows how social norms influenced the reuse rates of used towels among hotel guests. By placing a text saying that *"the majority of guests reuse their towels"* in the bathrooms, the reuse rates of the towels increased significantly, compared to merely informing the guests about environmental protection (Lehner, et. al., 2016; Goldstein, Cialdini & Griskevicius, 2008). Two types of social norms, *descriptive* and *dynamic norms*, will be explained in the following section.

8.1.1.2. Descriptive and dynamic norms

As an alternative to providing users with information about a product's or service's CO2 emissions, descriptive norms offer a way of influencing behavior to be more sustainable (Demarque, Charalambides, Hilton, & Waroquier, 2015). Descriptive norms are effective as they refer to what other people do, thus both drawing on social norms (Trudel, 2019) and social comparison (Gifford, 2011). For example, Demarque et al. (2015), show that information about and activation of descriptive norms (*"For your information, 70% of previous participants purchased at least one ecological product"*), can make people buy more sustainable products online (Demarque et al., 2015, pp. 169). Studies also show that social norms have a greater influence when they are performed by people that you have something in common with or identify with. Thus if people are told that someone from their neighbourhood or social circles act in a certain way, then it will have a greater influence on their behaviour (Griskevicius, Cialdini, & Goldstein, 2008). However, descriptive norms can have a negative effect on sustainable behaviour and consumption in situations in which the undesired behaviour is normal and desired (Demarque et al., 2015). According to Demarque et al., (2015), this problem can be dealt with by directing the attention towards reasons that

promote the desired sustainable behaviour, rather than drawing attention towards the unsustainable behaviour. Dynamic norms can be used to solve the problem. Dynamic norms direct the attention towards the aspect of change in the normative behaviour e.g. *“more and more people are starting to eat meat”*. Seeing that a behaviour is spreading will make people expect that it will become the norm in the future, which can result in them pre-conforming to the norm (Sparkman & Walton, 2017).

How the nudging tools and social norms have been incorporated into the design proposals will be elaborated on in Chapter 9.

8.2. Inspiration and ideation

As presented in the ‘analysing the data’ section (section 5.5) inspirations and ideas identified from the households diaries, on how to minimise their electricity and water consumption, have been translated into *inspiration cards* and *idea cards* to support the design process. The ideas have all been identified directly from the ‘idea box’ placed in the right corner of the diaries and ideas explicitly referred to as an idea in the diaries. The inspirations have been identified based on general inspirations e.g. that one of the residents wrote that she could be more aware of not letting the water run while cleaning. The inspirations from the inspiration cards have resulted in different inspirations such as the following examples (see *inspiration cards section 5.5*):

- *Bringing increase the awareness of using less pressure for things like rinsing vegetables or plates*

- *Bringing awareness to not letting the lights stay on in the middle of the day?*

- *Minimising the use of electrical appliances for cooking?*

The idea cards have resulted in different ideas such as the following examples (see *idea cards in section 5.5*):

- *Making low water pressure the standard function in the shower and making the high pressure to be a conscious choice (like an extra click)*

- *Make different functions on the tap in the kitchen (ex. low pressure for washing vegetables & high pressure for filling a pot)*

- *Make it easier to press the little ‘flush’ button, than the big “flush” button*

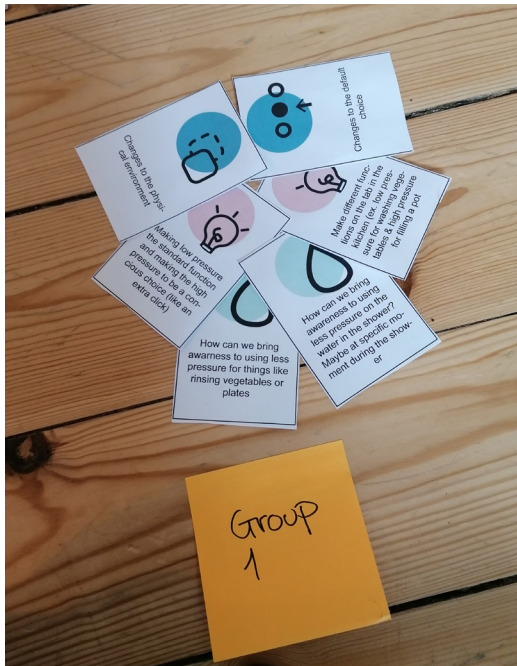
The inspirations and ideas, containing the households suggestions on how to minimise their electricity and water consumption have been used as the basis for developing the final design proposals. The next section will present how I have clustered the inspiration and idea cards together, to create an overview of the suggestions and to select which ideas to proceed with.

8.2.1 Clustering of inspirations and ideas

To create an overview of the inspirations and ideas, the idea and inspiration cards have been printed and cut into tangible cards that could be moved around. As an initial brainstorming process, I gathered the cards into 7 different clusters consisting of ideas and inspirations that



Picture 22. The 7 initial idea and inspiration clusters, generated from the households ideas and inspirations



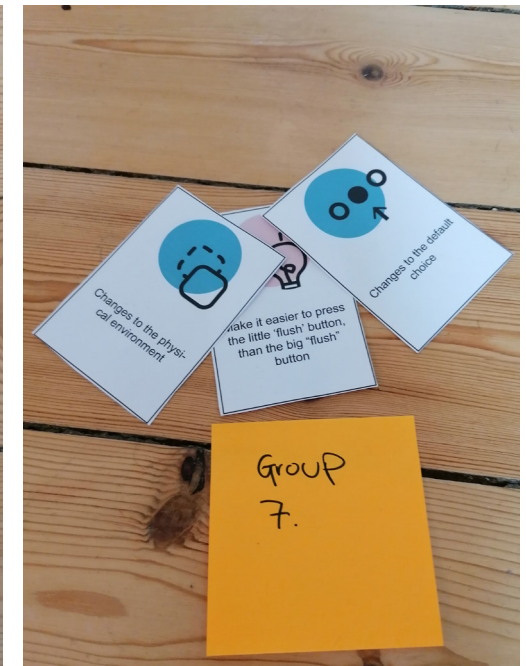
Picture 23. Idea and Inspiration cluster 1.



Picture 24. Idea and Inspiration cluster 2.



Picture 25. Idea and Inspiration cluster 3.



Picture 26. Idea and Inspiration cluster 7.

matched each other. Two of the 'groups' only consisted of one card each (see *picture 22*).

Upon generating the idea and inspiration clusters three of the clusters were removed, consisting of cluster 4, 5 and 6. The reason for removing those clusters was that the ideas were not as concrete as the ideas in the other clusters (e.g. *suggestions of producing non-electrical appliances for the kitchen; rinsing the cutlery in a bucket; and generating less dishes*).

Subsequently, a second brainstorming process has been conducted in which each of the four nudging tool cards have been applied to each of the four remaining clusters (cluster, 1, 2, 3 and 7) (see *picture 23, 24, 25 & 26*) and ideas gained from applying the nudging tools to the idea and inspiration clusters have been written down on post-its. Based on the brainstorming process, conceptual ideas for 5 design proposals have been identified – some more specific than others.

8.3. Existing solutions




Before proceeding with the development of the design proposals, a market research was conducted, to explore if any of the ideas identified from the design proposal already existed and to provide a benchmark of existing solutions to compare the design proposals against.

The market research showed that there are several products and technologies seeking to minimise household electricity and water consumption related to shower heads, kitchen taps, flushing systems, outlet systems and lighting technologies. The solutions are illustrated in *figure 3* below.

From the figure it can be seen that the existing solutions and technologies to reduce household energy consumption are based on informational feedback systems, customization, automatization, gamification, technological efficiency and smart technologies. Due to the scope of the market research, the solutions identified should not be viewed as exhaustive existing solutions, but as providing a perception of the types of solutions that exist on the market.

Furthermore, the market research also revealed that two of the identified ideas from the brainstorming process already existed. Therefore, these will not be included as some of the final design proposals, but will still be briefly elaborated on in the next chapter (Chapter 9), after presenting the final design proposals. The reason for including these products is that they still correspond to the households suggestions on how to minimise their electricity and water consumption.

Figure 3. Products and technologies seeking to minimise electricity and water consumption.

Consumption	Type	Description	Type	Description	Type	Description
	Informational Feedback systems	<ul style="list-style-type: none"> - Shower meters displaying real time information on the energy and water consumption while showering (Nature, 2018) - Shower meters that tracks and times the length of the shower and consumption (Vejle Kommune, 2020). 	Customization and gamification	Smart shower, with: sensors enabling the users to: customize the waterflow; set temperature preferences; set timer settings where and LED lights will blink to remind you to get out the shower. The sensors can be connected to the user's phone via Bluetooth Pairing (EvaDrop, n.d.).	Technological optimization	Different variants of water saving shower heads from Grohe: – imitating the form of the human body, seen from above; implementing a Eco-button to reduce the pressure; allowing the user to gradually reduce the pressure (Grohe, n.d. a).
	Technological optimization	Kitchen taps with 2 modes (spray and laminate) Hansgrohe (n.d.)				
	Technological optimization	In EcoBETA the 2-flush standard setting is a little flush. To create a big flush the user must push the button for a few seconds (GlobalTools, 2016).	Default choice	The dual-flush toilet makes it possible to choose how much water to use when flushing by giving three options: a single flush; a start/stop flush; and a dual flush (Grohe, n.d. b).		


Consumption	Type	Description	Type	Description	Type	Description
	Automatization	Occupancy sensors/ movement sensors - PIR sensor (Passive InfraRed sensor) can be installed so the lights are controlled automatically - turning on and off when entering and leaving a room (Life IS ON, n.d. a).	Smart lighting	Allows you to personalize your lights to turn on or off at certain times of the day, adjust them with the seasons, or control them while you are not home 4SIGHT (n.d.).	Changes to the physical environment	Flipp one switch and turn of everything: Power House (.n.d.)
	Technological optimization	Power outlets with integrated timers. The FUGA power outlets can be programmed to turn off at a specific time, ensuring that appliances that are connected do not use unnecessary electricity (Life IS ON, n.d..b).				

Figure 3. (continued) products and technologies seeking to minimise electricity and water consumption.

9. Design proposals

From the two remaining idea and ideation clusters, three design proposals have been developed. This chapter will present the three final design proposals that have been developed, involving a description of the concepts, how the design proposals differentiate themselves from existing concepts and how they correspond to the insights learned about the households practices during the design intervention. Subsequently, the two identified ideas that already existed will be briefly elaborated on.

9.1. Design proposal 1 & 2.

The first two design proposals are about reducing water consumption by making low water pressure the standard function and enabling different functions for different needs. They both build on the households suggestions to, *make low water pressure the standard function and make different functions for different needs* (e.g. showering, rinsing vegetables), (see *inspiration and idea cluster 1, section 8.2.1.*). Following, the nudging tools ‘changes to the physical environment’ and ‘changes to the default choice’ have been applied to make different functions available and to change the standard choice, in case the users do not take any action. Within the COWOP framework the design proposals can be viewed as changes to the ‘near materiality’ as they address appliances in the households close physical environment, that are under individual control (see *figure 4*). The household’s suggestions have resulted in two design proposals

	Shared	Individual
Abstract	Societal Structure	The Individual
Physical	Infrastructure	Near Materiality

Figure 4. Showing which area in the COWOP wheel, design proosals 1 & 2 address

consisting of the default-low-pressure-kitchen-tap and default-low-pres-
sure-kitchen-tap.

9.1.1. – 1. The default-low-pressure-kitchen-tap

The default-low-pressure-kitchen-tap is a kitchen tap with two modes and functions – a low pressure spray mode and regular laminar spray mode. The low pressure spray mode is set as the default mode while the user is required to push a button or make an extra click on the tap to put it on laminar spray mode, making it a conscious choice to shift the mode to laminar spray. The low pressure spray mode is intended for practices consisting of i.e. rinsing vegetables, rinsing the dishes, washing hands etc. whereas the laminar spray mode is intended for practices that require the same amount of water regardless of the pressure consisting of e.g. filling a pot or a glass of water etc.

9.1.2. Benchmarking against existing solutions

The market research revealed that kitchen taps with 2-spray modes (laminar and spray jet) already exist. These allow the user to push a button on the tap to enable the spray mode. This gives the user the option to push the low-pressure spray function, but it entails that the user is aware of his/her water consumption and consciously takes the choice to minimise it or is interested in the spray function for other reasons. However, by making a low-pressure-kitchen-tap as the default this can prompt the user to consider his/her water use while still allowing the user to overrule this mode by pushing a button or making an extra click. The importance of allowing the users to overrule the default choice is stressed by Mortensen (2020) who argues that the users must always be able to overrule default settings in their own homes. The reason for this is that people should always have the power and autonomy to do what they want in their own home.

9.1.3. – 2. The default-low-pressure-showerhead

Similar to the default-low-pressure-kitchen-tap, the default-low-pressure-shower-head is a shower head with two modes and functions – a low pressure spray mode and regular laminar spray mode in which the low pressure spray mode is set as the default and the laminar spray mode is optional, requiring the user to make an click on the shower-head. The low pressure shower head is intended for use during parts of the shower when users do not need high pressure e.g. shaving. The high pressure option is intended for parts of the shower in which the user needs higher pressure e.g.. rinsing the shampoo out of one's hair.

9.1.4. Benchmarking against existing solutions

The benchmarking revealed that various showerhead solutions designed to minimize water consumption exist. Many of these consist of feedback systems, timers and systems to customize the waterflow, temperature preference and duration. Also, showerheads with two spray modes exist allowing the user to push a Eco-button on the showerhead to enable the low pressure mode. Similar to the kitchen tap with two spray modes it gives the user the option to push the low-pressure spray function, but it still entails that the user is aware of his/her water consumption and consciously takes the choice to minimise it. Correspondingly the feedback systems, timers and customized water systems require the user to make a conscious choice and also provides the user with a lot of information that he/she needs to consider. Reversively, the default-low-pressure-shower-head sets the low pressure spray function as the default function, while still providing the user with the possibility to overrule this mode by pushing a button or making an extra click in line with providing the user with personal autonomy in his/her own home.

9.1.5. Coupling with social practices

The design intervention revealed that many of the household energy consuming practices lie in people's routines, habits. Design proposal 1 and 2 addresses some of the bodily aspects of performing their everyday practices, by making the *automatic choice*, the *default choice*. The insights from the design intervention show that although it is difficult for the households to decrease their comfort and convenience levels there is a potential in minimising what many of the households refer to as 'unnecessary water consumption' that does not affect their comfort or convenience level. The default-low-pressure-kitchen-tap and the default-low-pressure-shower-head address this unnecessary consumption, while still enabling the users to use full water pressure for practices that consume the same amount of water regardless of the pressure. The importance of providing the households with the choice becomes visible through the insights revealing that although low pressure showerheads were implemented in all the apartments of BOLIG+, the household at BOLIG+ deliberately removed the low pressure showerhead because they found it inconvenient. Also the family living at the zero-energy building FBG states that although the low pressure showerhead in their apartment has three different functions (see *picture 28*), they are all lower than what they like. Although the family at FBG express that they got used to the low pressure showerhead, the low pressure functions can be seen as overruling their personal autonomy, in that they are not able to get the pressure that they prefer. Implementing a solution with both a low pressure and laminar spray mode will provide the user with the opportunity to change the function to high pressure when desired rather than overruling the households personal autonomy of using high pressure. Although the households will choose the high pressure function in

some instances the click or ‘push the button’ function will make them aware of their extra consumption in a subtle way.

Picture 28.
Showing
three dif-
ferent low
pressure
modes (Rain
O2, Rain and
Massage)



9.2. Design proposal 3.

The third design proposal focuses on reducing households’ energy consumption by enabling the households to make a competition with themselves and by referring to what other households are doing. The design proposal builds on the households’ suggestions *to monitor* and *get information* about once consumption and *creating a competition* with oneself (see *inspiration and idea cluster 2, section 8.2.1.*). The nudging tool ‘simplification and framing of information’ ‘have been used to

present the information in a straightforward way. The nudging tool ‘social norms’ have been applied to influence the households behaviors. Within the COWOP framework the design proposal can be viewed as changes to the ‘near materiality’, and to the ‘societal structure’ of the households (see figure 5). Changes to the households’ ‘near materiality’ can be seen as the design proposal attempts to change the way the households use the appliances in their close physical environment, that are under individual control. Changes to the ‘societal structure’ can be viewed in that the design proposal targets broadly accepted norms and the meaning of the practice.

	Shared	Individual
Abstract	Societal Structure	The Individual
Physical	Infrastructure	Near Materiality

Figure 5. Showing which area in the COWOP wheel, design proosal 3 addresses

9.2.1. – 3. The insert-your-personal-goals system

The insert-your-personal-goals-system is a system that builds upon the use of gamification and social norms. This allows the user to make a competition with his/herself and other households in the building. The system monitors the users entire energy consumption (water, electricity and heating) and allows the users to insert their own goals (month/ week) for each area of consumption. The users will be able to insert and track their consumption from a screen placed centrally in the residence. Emphasis will be put on framing and simplifying the information about the households consumption. Moreover, the weekly or monthly updates

on the households consumption will be portrayed in conjunction with the use of descriptive and dynamic norms. Rather than providing the users with 'negative' information about their CO2 emissions, descriptive norms (see section, 8.3) will be used to draw attention towards reasons that promote the desired sustainable behaviour in reference to the other households in the building, e.g. *"the majority of the other households turn their lights on after dusk"* or *"the majority of the other households shower every second day"*. Also dynamic norms will be used to update the users, on aspects of change in the normative behaviour, e.g. *"more and more of the households use less electrical appliances"*. Seeing that a behaviour is spreading will make people expect that it will become the norm in the future, which can result in them pre-conforming to the norm (Sparkman & Walton, 2017).

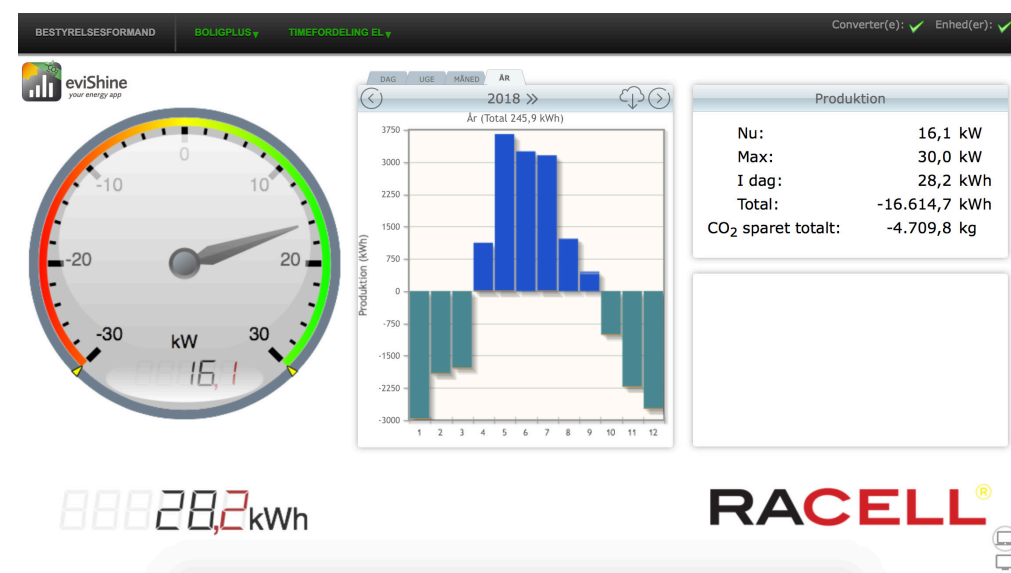
The aspect of gamification can motivate the households to minimise their energy consumption for a period of time, but it will probably lose its newsworthiness and effect at a point (Mortensen, 2020). However, if the element of gamification can make the households minimise their energy consumption for a period, this data can be used as a starting point for generating descriptive and dynamic norms that on the long term might promote that the households in minimising their consumption and change the normative consumption in a more sustainable direction.

9.2.2. Benchmarking against existing solutions

The benchmarking process revealed that many different types of displays, trackers, control systems, timers etc. exist providing the users with the opportunity to get information and track their consumption and CO2 emissions etc. The insert-your-personal-goals-system differs from these systems in that it takes use of social norms in the form of descrip-

tive and dynamic norms to frame the households desired and sustainable behaviour rather than providing the users with a lot of information about their consumption which might be difficult to understand. Using BOLIG+ as an example, the building has a web based energy management system in which the households can track their consumption on an hourly basis. On the webpage, the household's electricity consumption is portrayed in graphs and numbers along with the CO2 emissions (see figure 6). The graphs are difficult to read because they portray both the 'green' energy consumed from the solar panels (the blue lines going upward) and the 'black' energy consumed from the utility company (the green lines going downward). In contrast, in the insert-your-personal-goals-system, emphasis will be on simplifying information portrayed and making it playful by involving the households in setting their own goals. Moreover, rather than focusing on the amount of energy used in numbers, the focus will be on social norms in the building.

Figure 6. Showing BOLIG+ electricity consumption for 2018.



9.2.3. Coupling with social practices

The design intervention revealed that the meaning associated with some practices were stronger than in other practices. For example, the insights showed that some of the households did not want to be reminded of the negative consequences related to their consumption in relation to the practice of showering. As such, the existing solutions consisting of screens, timers and 'melting icebergs', reminding people how much water they have used, CO2 emissions the shower has cost or how much time they have spent etc. might 'destroy' the meaning related to taking a shower. Alternatively, the insert-your-personal-goals-system addresses household consumption by focusing on the desired sustainable norms rather than focusing on the undesired behaviour. The use of descriptive and dynamic norms can address the symbolic meaning associated with showering or the use of multiple electrical appliances etc. through the construction of new norms. In comparison to the existing solutions that provide the user with a lot of information while they are *in* the shower, the insert-your-personal-goals-system will not be placed in the shower and thus not make the users aware of their consumption while they are showering. Instead the use of descriptive and dynamic norms will slowly construct new norms and to make people pre-conform to new norms.

9.3. Additional proposals

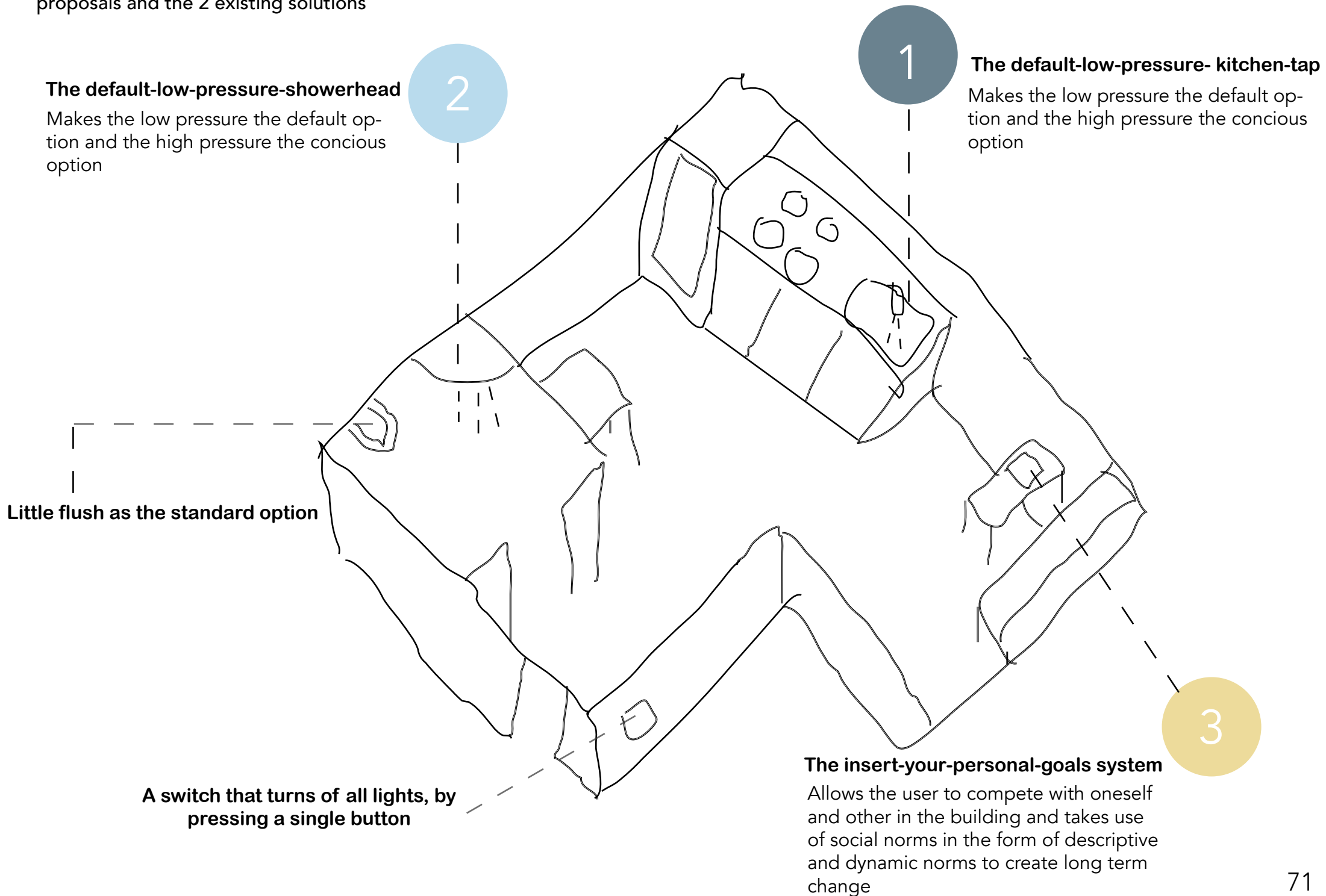
Two of the ideas identified by the users that already exist, involve ideas related to the households' lighting patterns and water consumption in relation to flushing the toilet (*see inspiration and idea cluster 3 & 7, section 8.2.1.*). The first idea entailed implementing a central switch in residences that were able to turn off all the lights together by pushing one switch. The second idea involved making the little flush button the default choice or switching the little and big flush buttons around, mak-

ing the little flush button the 'easiest' to push. Although the solutions are not a part of the design proposals of this thesis, they still correspond to the insights, ideas and inspirations gained from the design intervention. Therefore, they have been included in the final recommendation presented in the next section.

9.4. Final recommendation

The final recommendation presents a combined overview of the three design proposals developed in this thesis along with the two existing solutions (*see picture 29*). This thesis recommends that buildings labeled as sustainable implement these design proposals into the buildings, to support the households in minimising their everyday use of electricity and water.

Picture 29. Provides a combined overview of the three final design proposals and the 2 existing solutions



10. Discussion

This chapter will open with a criticism of nudging. In the broader context of design and governance nudging is often considered as manipulative. Further, the effectiveness of nudging and the use of nudging in the design proposals of this thesis will be discussed. Finally, the Covid-19's potential effect on changing societal structures will be discussed in relation to the future of building industry and potential changing household practices.

10.1. Can the 5 Day Challenge change anything?

It appears that the households' taken for granted services were put into perspective during the '5 Day Challenge', as the households began to feel grateful for some of their services and reflect upon areas of consumption that could be reduced. Nevertheless, since the Living Lab was only short term, and the households practices were only temporarily 'destroyed' it can be discussed whether this new perspective will last on the long term. It is however doubtful, since Shove (2012) argues that a practice can only remain, if the connections between the elements of *material*, *competence* and *meaning* are continuously renewed. In comparison the Living Lab conducted by Jensen and Friis (2019) lasted 11 weeks and they argue that it lasted long enough to establish the basis for shaping habits in the participants' natural contexts. Nevertheless, – whether some of the households practices will change or not, the notion of 'breaking' the households' water and electricity services has made it possible to test in real life and bring forth some moods and taken for granted practices that the households themselves would not be aware of if merely asked about it.

The insights gained through the design intervention both support the existing literature in the field of households energy consuming practices, but it also adds new insights. On one hand, the insights from

households everyday practices related to lighting supports the findings of previous studies showing how *multiple* and *combined* lighting sources are associated with coziness and attuning the right atmosphere (Jensen, 2017; Crosbie & Guy, 2008), but on the other hand it also brings attention to how the *lack of lighting* can be associated with a bad and even depressing mood.

Also, the insights support Shove's (2003), findings that the practice of bathing is related to several dimensions of: fitting into society, personal pleasure and *luxury and getting ready for a new day*. However, the insights also show that those dimensions differ considerably between the households and that some of the existing products seeking to minimise water consumption might even ruin the meaning associated with showering for some households. Similarly, the insights from the households indicate that practices of cleanliness differ across the households, indicating that 'one type fits all' solutions are not possible when changing household practices related to cleanliness.

Furthermore, although the insights support Shove's (2003) findings that comfort, convenience and cleanliness are strong drivers for households energy consumption, the insights also indicate that the households had a tendency to give up on minor aspects related to practices of cleanliness for the sake of convenience. Buildings on Gram-Hanssen's (2013) finding that the amount of appliances in use are growing, this study finds that the majority of the households have a special need for preparing their coffee in a certain way – involving an electrical coffee grinder.

10.2. Is nudging more manipulative than other designs?

Nudging is not an undisputed concept. The criticism of nudging is mainly concerned with the danger of opposing democratic processes,

implicitly manipulating people and violating personal autonomy (Lehner, et. al., 2016). One line of criticism suggests that designing to know which choice is best for the individual, based on some presumed objective measures, may fail to account for other, unknowable, factors related to the individual's higher-order desires related to the individual's values (Felsen, Castelo, & Reiner, 2013). However, on the other hand, influencing decision processes might also result in aligning decisions with the individuals' higher-order desires and enhance autonomy (Felsen, Castelo, & Reiner, 2013). Wilkinson (2013) finds that nudges are only manipulative, if the methods perverts the person's decision and if the intentions are manipulative. He further argues that nudges must have a genuine escape clause which genuinely allows the person to opt out. As long as the person has consented to the nudge and that it does not violate the person's autonomy, then Wilkinson (2013) considered nudging as an appropriate approach. However, the critique of nudging – influencing people's decision processes can also be discussed in terms of governance.

Drawing on Woolgar and Neyland (2013), who state that *"objects (and technologies) are governance and accountability made durable"* (Rosenqvist, 2017, pp. 5), it can be argued that all objects and technologies that we are surrounded with influence our decision making. This perspective of governance is referred to as mundane governance, which takes the point of view that the everyday designed 'stuff' that we are surrounded by governs our behaviour. Rosenqvist (2017) refers to Woolgar and Neyland (2013) example of how the introduction of a waste bin in a household makes the household and its waste governable entities, because the waste bin directs attention to filling the bin (Rosenqvist, 2017).

Another perspective of governance relevant to design is the notion of meta-governance (Rosenqvist, 2017). According to Rosenqvist and Mitchell (2016), the role of design in today's society is expanding

from being primarily concerned with shaping the physical world to a larger extent influencing social realities. From a meta-governance perspective, design processes, including codesign, participatory design can be considered governance. Along with designers' possibilities to influence the social world, comes the responsibility of being critically aware of the interplay between their designs and the potential underlying power relations (Rosenqvist & Mitchell, 2016). Through the product and the process of design, designers are either consciously or unconsciously producing, reproducing or questioning governance relations, they become a part of governing. In this way, *"design is governing and design is governance made durable"* (Rosenqvist, 2017 pp. 6).

It can be argued that this study is both questioning, producing and reproducing governance. First, the design intervention conducted in this study can be considered as a form of meta governance in that it is questioning the governance of the underlying rules, norms, infrastructures and technologies that households take for granted in their everyday lives. Through the design intervention the 'invisible' and taken for granted services were temporarily 'destroyed' which made the households reflect and become aware of these services. Second, the design proposals developed in this study can both be seen as producing new modes of governance and reproducing governance existing modes of governance. The design proposals can be argued to produce governance as the solutions aim at creating new ways for the households to fulfill people's needs more sustainably. On the other hand, they can also be argued to reproduce governance as the solutions do not question if some of the needs should even be met. As an example, Shove (2003), argues that a green freezer is still a freezer after all, which preserves the current practice of – reliance on frozen food – for granted. Similarly, the design proposals offered in this thesis making changes to the default

setting in kitchen taps and showerheads allow people to stick with their habits.

10.3. Can nudges change anything?

The evidence-base for the effectiveness of nudges in the field of sustainable consumption is only emerging. Most of the evidence gained is based on small-scale experiments which are easier to control for other variables than large-scale rollouts, but often do not provide the same dramatic results (Lehner, Mont, & Heiskanen, 2016). Still, Lehner, et. al. (2016) argue that nudges hold a certain potential for reducing environmental impacts on critical domains of sustainable consumption, including energy, food and transport. They further find that the use of nudging seems to have the highest impact in the domain of energy use in housing. However, nudges should not be seen as a replacement for traditional policy tools, but rather as a complement to improving the effectiveness and efficiency of these tools. Although the nudging tool, 'default setting' might be one of the more controversial tools to apply, the default tool seems, according to Lehner, et. al. (2016), to be the most effective instrument in the consumption domains of energy, food and transport (Lehner, et. al., 2016). As an example, they mention studies on energy use, making use of the default choice tool, providing users with the option to opt-out, show that 90-99% of people stay with the green default option. Whereas, studies using nudging in the form of social comparison billing, only showed a 2% reduction of energy use. Thus highlighting the importance of the kind of nudge and the 'task'. In keeping with these findings, the first two design proposals described in chapter 9 seem to have the biggest potential in supporting the households in minimizing their energy consumption – as they draw on the 'default setting' nudging tool. The use of descriptive norms and dynamic

norms might prove more difficult to apply, as the messages have to be continuously formulated and tailored to the households consumption.

The strength of the design proposals suggested in this study is that they combine insights of household practices with the nudging tools, ensuring that the solutions correspond to the households everyday practices. Nevertheless, the limitations are that the insights gained are based on a small-scale explorative living lab set up, which makes it difficult to generalize the findings to the broader public.

In comparison to this small-scale experimental design in which six households' everyday practices have been de-routinized, the Covid-19 can be viewed as large-scale 'natural' experiment causing large-scale moments of de-routinization on a broader societal and even global level. What this 'natural' experiment and the following changing societal structures will mean for the future building design and peoples sustainable consumption patterns will be discussed in the next section.

10.4. What will the changing societal structures mean for household consumption patterns?

Although transitions in society typically occur gradually, spanning over 20-25 years, Kemp and Loorbach (2006) argue that a transition can be accelerated by one-time events, such large accidents (i.e. Chernobyl) or a situation of crisis (i.e. the oil crisis). The outbreak of corona pandemic Covid-19, which on January 30th has been declared a national health crisis by the WHO (World Health Organisation) can be viewed as such a one-time event. The whole world has shut down – millions of people are in carantene, thousands of airplanes are standing still, and schools, institutions and workplaces have closed, – with some choosing to work from home. All these measures have disrupted the economy world wide, which among other things have resulted in the CO2 emissions,

decreasing considerably (Peters, 2020). According to the utility company, HOFOR, the registered water consumption has decreased considerably during the corona pandemic. The Press officer at HOFOR, Astrid Skotte, argues that a part of the reduction in water consumption might be a result of people staying home all day, washing less clothes and showering less. On the other hand more water may be used on flushing the toilet, brewing coffee, cleaning etc. (Modler, 30. March, 2020). As we are still in the middle of a pandemic it is difficult to predict how society will be affected when the crisis is over. *Will people shower more or less? Will people use more or less electricity? Or will people continue working from home?* These are some of the questions that are being raised in society (Thomsen & Gaarslev, 5. Maj, 2020). Big companies like Facebook and Twitter estimate that a large part of their employees will be able to continue working from home (McLean, 22, May, 2020). In the same way, companies developing household technologies should raise the question of, *how the changing societal structures in society will affect the building design in the future?* and, *how the potential new practice of working from home will affect other household practices?* From a social practice theoretical point of view the new technologies related to, and possibilities of people working more from home will affect other practices in the home.

11. Conclusion

This project has through, qualitative and experimental methods explored *how to engage households in minimising the use of basic amenities such as water and electricity*. Six households have been engaged through a design intervention, taking the form of a Living Lab set up. Probing kits have been used to challenge the households and get an insight into their everyday routines.

The performance gap, normally associated with conventional housing, appears also to be an issue in buildings labeled as sustainable. The findings from assessing the performance gap of BOLIG+ showed that a performance gap existed in the electricity consumption of the building, which was about 20% higher than projected. On the other hand, the average water consumption in BOLIG+ was roughly 10 liters below the water consumption of the average danish person. The design intervention revealed that low pressure showerheads have been installed in all the apartments in the building, which might be one possible explanation for the lower level of water consumption.

The findings from the design intervention show that many of the household's electricity and water consuming practices lie in their routines and habits and that the services that make their practices possible are 'invisible' and taken for granted. Creating a design intervention that temporarily 'destroyed' and challenged the households 'invisible' and taken for granted practices has proven useful in making the households more aware about the services in their home that they might otherwise take for granted. This made it possible to locate areas in which the consumption can be minimized without affecting the household practice – e.g. rinsing vegetables on low pressure. On the other hand, it also made it possible to locate areas in which the consumption can not be mini-

mised or changed in the same way, due to the meaning associated with the practice. Those areas of consumption were especially related to the practices of showering, drinking coffee, and illuminating the home – e.g. for some of the households a short and low pressure shower would not provide the same sense of relaxation. These insights indicate that it is necessary to understand how the consumption and practice are linked before attempting to change the practice. The insights also reveal that convenience and comfort are strong normative drivers for the households practices. Convenience and comfort are linked to the aspect of *possibilities* – e.g. the households found it more annoying to use low water pressure when they knew it was *possible* to do it faster, and. These insights indicate that the aspect of *possibilities* should be considered in relation to changing a practice if it is to have the intended effect. Moreover, insights from the intervention reveal that practices of cleanliness differ across the households and that the households have a tendency to give up on minor aspects of cleanliness for the sake of convenience. These insights indicate that 'one type fits all' solutions are not possible when changing household practices related to cleanliness. Finally, the insights show that 'breaking' different services, affected the households practices in various ways – both positively and negatively. These insights indicate that changing people's practices comes with a responsibility. It is necessary to understand the relationship between the service and practice, as well as the practice's effect on other practices, before designing for change.

Based on these insights, and the inspiration and concrete ideas gained through the design intervention and drawing on selected nudging tools, three design proposals have been suggested to support the households in minimising the performance gap in buildings labeled as sustainable.

The aim of the first two design proposals is to minimise the ‘unnecessary water consumption’ without affecting the households comfort or convenience level. They build on suggestions to, *make low water pressure the standard function* and *make different functions for different needs* (e.g. showering, rinsing vegetables). The nudge tool card ‘changes to the default choice’ and ‘changes to the physical environment’ has drawn upon to develop a kitchen tap (the default-low-pressure-kitchen-tap) and showerhead (the default-low-pressure-shower-head) providing the households with two spray modes – a laminar spray mode and low pressure spray mode. These two spray modes can be found in already existing products, but the two design proposals set the low pressure spray mode as the default setting, whereas the regular laminar spray mode will require the user to make an extra click. Set as the default setting, the low-pressure spray mode will be the unconscious choice whereas the laminar spray mode will be made the conscious choice – however, still providing the user with the option to overrule the default choice.

The third design proposal builds on suggestions to monitor and *get information* about once consumption and *creating a competition* with oneself. The design proposal addresses the issue that some of the households did not want to be aware of their consumption in relation to particular practices because they felt that these insights would disturb or even ruin the meaning of the practice. The nudge tool ‘social norms’ and ‘simplification and framing of information’ has been drawn upon to develop a system (insert-your-personal-goals-system) in which the households can insert their own goals for their weekly or monthly energy consumption, and then monitor their consumption. The design proposal differs from existing information feedback systems by framing the households desired and sustainable behaviour rather than providing the users with a lot of information about their consumption, which

might be difficult to understand or ‘hitting’ them in the head. The use of descriptive and dynamic norms address the symbolic meaning associated with some of the households practices through the construction of new norms.

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13. Appendix



URHV

DIARY: DAY 1

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

yes!

Were you surprised about the amount of water you used? Did something else surprise you?

Not so much about the amount, but really surprised about how automatic my first reflections to get water are, not even thinking about it.

Did the daily challenge affect any of your other routines in your home?

No.

Other reflections?

We thought about how uncomfortable is to do everything on/in the bathroom since shower is very tiny. So we use mainly the shower and were very careful or at least tried not to waste too much of it.

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

it was alright, although limited our food options. We tried to eat as simple as possible to avoid the "trip" to the toilet to use water or having to run to wash afterwards.

Did the daily challenge affect the way you would normally cook/take the dish, etc.?

yes! most definitely change our diet and the cleaning. To be honest will wait until tomorrow to do the dishes.

Ideas?

If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.

DAGBOG: DAG 1

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig, er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Næsten. Kaffemaskinen skulle rengøres for at virke, og det var simpelt nok for stort et projekt at flytte ud på badeværelset. Men ellers brugte jeg flasker fyldt på badeværelset. Og så vaskede vaskemaskinen. Det havde jeg slet ikke tænkt over. Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var lidt (be)svær(igt). Måske glippede den en gang et to, fordi jeg er så vant til bare at have vand tilgængeligt.

Blev du overrasket over hvor meget vand du brugte? Var der andet der overraskede dig?

Jeg blev mest overrasket over, hvad jeg bruger vand til, fx. at skylle kaffeklude op, fylde vand på kaffemaskinen. Derud over havde jeg slet ikke tænkt over, at jeg bruger vand i køkkenet til opvaskemaskinen.

Påvirkede dagens udfordring den måde du ellers ville lave mad/tage opvask på, osv.?

Den burde have påvirket opvask, men det glemte jeg. Det ville klart have påvirket aftersmaalen, hvis jeg ikke havde fået take away. Valgte løsninger ellers, der ikke krævede vand. (Guic/sada i stedet for vand)

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Ikke udsat. Altså (dagens) rengøring, fylde hendes vandskål og så den gav flere skridt. Men købte mad ude fra Cikke pga. "mangel på" vand, men fordi jeg var dovnen!

Andre refleksioner?

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Vi har faktisk et system/program, der overvåger vores forbrug på timebasis. Det kunne jeg tænkte mere.

DAGBOG: DAG 1

lettere for dig, er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

We nearly succeeded
Tzili opened the tap
once by mistake to
wash his hand while
cooking "
Just shows that it
is just habit, that
you can't control

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

It wasn't that hard.
because it was only one
day. Fr we didn't take
the dish all day
because we are lazy).
But if it had been longer
then we would be forced
take the dish and
take a washing aswell,
that would have been

Blev du overrasket over hvor meget vand du brugte? Var der andet der overraskede dig?

~~By~~ I don't think that
we used alot of water,
again because we chose
not to fr take the dish.
But I was surprised by
how many times I had
to go to the bathroom to
get water for little things
that I usually wouldn't
have noticed.

Påvirkede dagens udfordring den måde du ellers ville lave mad/tage opvask på, osv.?

Not cookingwise. We
got water from the bathroom
to cook pasta and fill
the kettle for coffee.
But yes, the dish we
didn't take. We are
used to the dishwasher
(spoiled)

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

We were talking
about having one
of Tzili's study friends
over to study.

We ended up not
doing. It was mostly
me that felt uncon-
fortable having him
and bringing him water
from the bathroom.
Tzili didn't mind
So much, he would just
tell him we had a
challenge

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Andre refleksioner?

It definitely made
me think about
how we usually don't
think so much about
using water in the
kitchen. Also that
I just many times
let the water run for
a long time, when
washing and cleaning

DAGBOG: DAG 1

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig, er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

DET VAR EN
SUCCES!

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

DET VAR IKKE SVÆRT
MEN DET VAR MEGET
MERE TIDS-KRÆVENDE
OG DET VAR UANT.

Blev du overrasket over hvor meget vand du brugte? Var der andet der overraskede dig?

JEG SYNES VI
SPILDE MEGET
VAND. JEG TROEDE
AT SPANDEN VLE
MINUSKE MIT FORBRUG

Påvirkede dagens udfordring den måde du ellers ville lave mad/tage opvask på, osv.?

JÅ, DET VAR BLA.
MER HYGIENISK.

NOK MANGLENDE
RUTINE.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

NEJ, IKKE SPECIELT

Andre refleksioner?

VI ER GENERELT
MEGET BEVIDST
OM VORES VAND
FORBRUG.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

SPILDEVANDS OPTIMERING
F.eks.: BRUGTE KØKKEN SPILDEVAND
TIL TOILETSKYLD.

OPSTILLETTE VANDTÆNDE KAN

FR

DAGBOG: DAG 1

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig, er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Det lykkedes at fuldføre udfordringen! Vi satte den sorte spand i køkkenet fyldt med vand i Håndvasken. Det gjorde os opmærksomme på ikke at bruge vandhane.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Ja der var flere gange at vi pludselig var ved at tænde for vandet. Abigail (8 år pige) syntes det var uinteressant at drikke vandet fra Badeværelset (krævede en snak om vand og

Blev du overrasket over hvor meget vand du brugte? Var der andet der overraskede dig?

Vi brugte ikke meget vand spanden klarede hele dagen som til vask af Børde og rengøring. ca 8 liter. Køkkenet var væsentligt mere rodet og opvask stod til dagen efter!

Påvirkede dagens udfordring den måde du ellers ville lave mad/tage opvask på, osv.?

Ja - Det der kunne komme i opvaskemaskinen kom derind og det vi normalt vasker i hånden stod til dagen efter. Jeg drak nok heller ikke lige så meget vand.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Udfordringen gav os nogle situationer med grin - Når den anden var lige ved at tænde vandhane

Andre refleksioner?

Det var sjovt at kunne snakke med vores datter om udfordringen som var en udfordring i sig selv :) Vi blev klar over bevidst om hvor nemt et køkken med vand i hane gør hverdagen Et sjovt lille eksperiment!

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Jeg tænkte på at man i bilen i dag kan følge sit benzin forbrug, måske kunne en sms eller noget der talte op/ned skabe et indsigt i forbruget?

Det kunne skabe konstant med



SHV

DAGBOG: DAG 1

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig, er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja! Mission accomplished. Det er jo ikke særlig fedt at vagne op til en vandhane der ikke virker! Lort Lort Lort! Meen... vand fra badeværelset bliver også til kaffe!)

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Spanden kunne ikke komme under vandhænen i badeværelset, så måtte benytte en mindre gryde. Specielt madlavning var svært - skylle en tomat, skylle en agurk og noget salat. Det blev til mange tur mellem køkken og badeværelset. Vaske hænder når man har

Blev du overrasket over hvor meget vand du brugte? Var der andet der overraskede dig?

Brugte ca. samme mængde vand til at skylle tomater og agurker eller til at vaske hænder, men opvasker blev taget med 5 l. vand. normalt vasker jeg op under vandhænen, så ca. 3 eller 4 gange mindre.

Påvirkede dagens udfordring den måde du ellers ville lave mad/tage opvask på, osv.?

Ja, virkelig meget! Alt vand man bruger til selve madlavning, skal være rent, hvilket betyder mange ture på badeværelset, så mest en tidsmæssig udfordring.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Grundet det noget mindre armatur i badeværelset, skulle den store gryde fyldes ad flere omgange.

Vaskede op i en spand frem for at tænde opvaskemaskinen.

Andre refleksioner?

Tænk! hvis der lugtede af sør røv på badeværelset og jeg skulle skylle en tomat?

Tænk! hvis jeg ikke fik min morgenkaffe fordi badeværelset var optaget!

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Skyl tallerkner og bestik i en spand med vand, frem for at gøre det under en rindende vandhane.

DAGBOG: DAG 2

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

but only I took power, Not 12L. started out my shower with full pressure but I fast remembered and had it low power the of the shower.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

actually wasn't bad to shower low pressure.

Why I don't want to long showers because I feel bad using alot of water today with low pressure I felt like it was to take a little bit.

Fik dagens udfordring dig til at tænke hvorfor du tager bad, som du normalt gør?

yes. it made me think that the reason why there is usually alot of pressure on my shower is that I don't need to make a conscious choice to get that. This is just what happens when I turn the water on. On the other hand I had to make a conscious choice for

Påvirkede dagens udfordring den måde du ellers ville tage en bruser/bad på?

No not really.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Yes, we actually used low pressure in all the house today. It was more enoying in the kitchen, to fill a pot with low pressure (took time) But when just washing a plate or something else it was okay.

the low pressure.

Andre refleksioner?

I thought about how much unnecessary pressure there is on the coming out of tap or shower in many situation and how much unnecessary water we are using way.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

I think low water pressure should be the standard and that it should be made a choiche to get high pressure (like an extra click or something like that)



SHV

DAGBOG: DAG 2

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var ikke svært, det tog længere tid at få shampoo i håret.

Fik dagens udfordring dig til at tænke hvorfor du tager bad, som du normalt gør?

Det er et dilemma - hvis jeg ville tage et hyggebad for at få varmen ville det ikke fungere med halv tye, så det ville blive et hurtigt bad og jeg ville derfor bruge mindre vand, men hvis jeg bare skulle i bad for at blive ren, tænker jeg at jeg ville brug ca. samme mængde vand.

Påvirkede dagens udfordring den måde du ellers ville tage en bruser/bad på?

Jeg gad ikke tage et længere hyggebad.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Ikke rigtigt, alt tog bare længere tid.

Andre refleksioner?

Hvis jeg havde haft et karbad, havde jeg ikke fyldt det den

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Det at vandtrykket var nødsat gjorde hver for sig eller det at skylle fx frugter eller skille tallerkener og bestik. Det er unødigt at bruge faldt tryk til sådanne småting, så er jeg blevet mere bevidst om.



RHV

DIARY: DAY 2

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

YES!

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

NOT AT ALL

Since, Funny enough my "bulb" had issues with water pressure during the morning, until midday.

Were you surprised about the amount of time you used? Did something else surprise you?

washing Dishes took a few more minutes than usual, but overall I am as well we both are surprised we haven't done this before!
Make sense to use less water pressure in general.

Did the daily challenge make you think about the way you normally use water?

We had to remember to open the tap just half way, beside that I believe we both were surprised on the amount of water waste we were using full pressure

Did the daily challenge affect any of your other routines in your home?

a few things like filling up the water boiler and washing dishes took longer.

Other reflections?

We will continue using half pressure when making Sense, especially in the shower or brushing teeth.

Ideas? If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.



FB

DAGBOG: DAG 2

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja Og Nej
Vi var alle 3 i bad
os voksne havde
halv tryk på og barnet
kontrollerede vi ikke.
(Der er i øvrigt Ikke
stor forskel på halv
tryk og ful tryk fordi
vores bruser/dæmper
trykket i færdigen)
Det krævede en tilkendeg
I starten
Var det svært at fuldføre
dagens udfordring? Hvorfor
var det svært/ikke svært?

Det var ikke svært
for os voksne, men
for barnet var det
uoverskueligt at
kontrollere dæmper
valgte tryk!
så vi opgav.

Blev du overrasket over hvor
meget tid du brugte? Var der
andet der overraskede dig?

Ja det var da lidt
Irriterende at fylde
sit glads væd med
halvt tryk når man
ved det kan gøres
hurtigere.

Fik dagens udfordring dig til
at tænke over den måde du
normalt bruger vand på?

Ja - jeg tænkte på
at det ikke gav
mening når det var
vand til at Indtage
(et glas vand) mængden
er den samme og
tiden langsomere
Der er nok en sammen-
hæng den som skal
tages i betragtning.

Påvirkede dagens udfordring
nogle af dine andre rutiner i
hjemmet?

Nej - Ikke bemærkelsen
værdigt.

Andre refleksioner?

Vi bor i et 0-
energi hus og der
er i forvejen tænkt
på forbruget.
Det kan vi godt
lide så skal vi
ikke være så
ops!!

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du
kan blive mere bevidst om dit forbrug i hverdagen, så skriv
dem/eller stikord ned i dette felt.

Jeg syntes det giver mening med lavere
tryk til bad - toilet, men ikke
når det handler om en mængde jeg vil
bruge. (Et glas vand) eller (koge ris)

DAGBOG: DAG 2

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

YES!

Fik dagens udfordring dig til at tænke hvorfor du tager bad, som du normalt gør?

JÅ. JEG TÅGER IKKE KUN BAD FOR AT BLIVE REN, MEN OGSÅ FOR VÆRME, HYGGE, AFSLAPNING...

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

NEJ, MEN AFTENBADET BLEV AFLYST. DET VÅR IKKE SÅ TILTALENDE.

Andre refleksioner?

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

NEJ.

MAN MISTEDE IKKE BADET, MEN EN SKIFT I RUTINEN

Påvirkede dagens udfordring den måde du ellers ville tage en bruser/bad på?

JÅ, BADET BLEV IKKE SÅ LANGT OG KUN FOR FUNKTIONALITETEN

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

HER VIL JEG IKKE VÆRE BEVIDST (DET ER EN LUKSUS) MEN VANDET KUNNE GODT BLIVE GENBRUGT

DAGBOG: DAG 2

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja.

Blev du overrasket over hvor meget tid du brugte? Var der andet der overraskede dig?

Alt tog lang tid. Bort at fylde vand i vandskål, blev irriterende.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Dropperede at vaske hår. Her med vilje fjernet vandsprøjt delen i bruseren, fordi jeg gerne vil have fuld tryk på vandet, så kunne ikke overskue at skulle skylle shampoo ud på halvt tryk.

Andre refleksioner?

Overvejede om jeg spærrede vand. Kan tjekke det i vores system, hvis det er."

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

er en del sværere
dag 1. Alt tog længere

Fik dagens udfordring dig til at tænke over den måde du normalt bruger vand på?

Ja. Jeg er åbenbart meget forwent og pinligere!

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

~~SHV~~

SHV

DAGBOG: DAG 3

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja det lykkedes at fuldføre opgaven.
Det var meget hyggeligt.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var ikke svært at fuldføre udfordringen, trods at belysningen kun var en lampe og to sterinlys.
Det skabte faktisk en hyggelig stemning, men helt fint at det kun var for en aften.

Fik dagens udfordring dig til at tænke over, hvordan du normalt bruger lys i dit hjem, og hvorfor du bruger det sådan? Var der noget der overraskede dig?

Normalt ville alle lys i lejligheden være tændte, også i de rum jeg ikke besøgt mig i, så ja - udfordringen har klart fået mig til at tænke over mit stans forbrug.

Påvirkede dagens udfordring den måde du ellers ville tilbringe din aften på?

Ikke umiddelbart. Så længe at jeg tog lampe eller sterinlys med, kunne jeg gøre som jeg plejer.
Efter som at jeg ikke kunne tænde fjernsynet blev jeg dog tvunget til at være mere social med min gæst.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Nok aller mest den tid jeg havde siddet foran fjernsynet.
Kom flere gange til at tænde lyset i køkken og badeværelset selv om jeg stod med lamper i hånden, helt instinktivt.

Andre refleksioner?

Jeg tog min mobil - lader med på job, i tilfælde af at stønne stadig var gået da jeg kom hjem.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

DAGBOG: DAG 3

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var overraskende nemt. Det eneste sted vi ikke har vinduer er badeværelset, så lampen stod der og så var det bare at tænde den i stikket på stikkontakten. Resten af lejligheden er der stort vinduer, så lys det meste af dagen.

Fik dagens udfordring dig til at tænke over, hvordan du normalt bruger lys i dit hjem, og hvorfor du bruger det sådan? Var der noget der overraskede dig?

Det handlede vist virkelig meget om varme (om det er nemt). Vi har computer-styret lys, der kan indstilles til at tænde/slukke på bestemte tidspunkter. Vi anvender et system, der tænder/slukker (bag side)

Påvirkede dagens udfordring den måde du ellers ville tilbringe din aften på?

Ikke rigtig. Helt ud til solen gik ned havde vi masser af lys. Resten af tiden var tullet en fin lyskilde.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Ikke rigtig

Andre refleksioner?

Jeg tror, vi allerede er bevidste om vores e-forbrug, fordi vi har et system, der kan overvåge helt ned til den enkelte stikkontakt på timebasis.

Var ikke lige så opmærksom i tidl. lejlighed

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

DAGBOG: DAG 3

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Nej - Eller til dels
vi oplevede at
komme til at tænde
Lys et flere gange
men slukkede igen.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det sværeste var
tilberedning af aftensmad
Der var der virkelig
dårlig belysning og
mit humør blev
virkelig påvirket
af det.

Fik dagens udfordring dig til at tænke over, hvordan du normalt bruger lys i dit hjem, og hvorfor du bruger det sådan? Var der noget der overraskede dig?

Det overraskede mig
at jeg kom i så
dårligt humør!
Jeg er blevet bevidst om
at lys virkelig er vigtigt.

Påvirkede dagens udfordring den måde du ellers ville tilbringe din aften på?

Ja - helt klart. Vi
havde givet vores
datter lov til at have
lys på sit værelse.
Det gjorde at hun
opholdt sig på værelset
mere. Vi hyggede
med hørtilsning fra
Computern.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

- Det klant madlavning.

Andre refleksioner?

Lys er vigtigt i
hjemmet!

Det er nok der
strøm vi bruge
uden at være
hjemme der er
interessant.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Måske noget med at lys slukkes
hvis man forlader rummet.

DAGBOG: DAG 3

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja. Succes!
vi er vant til
Stearinlys-livet

Nej: Jemina
harde vilke klart
udfordringen alene
grundet angst og
depression (s)

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var svært
at lave kompotter
når vi ikke måtte
tænde lys
for demme ting.

Fik dagens udfordring dig til at tænke over, hvordan du normalt bruger lys i dit hjem, og hvorfor du bruger det sådan? Var der noget der overraskede dig?

Vi blev opmærksomme
på at lys efterlader
følelse i de rum
vi ikke er i.

Det var for mærkeligt
at se huset i
spejlet.

Påvirkede dagens udfordring den måde du ellers ville tilbringe din aften på?

Nej. Netop!

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Nej.
Det var ingen
problem.
men det (i
i refleksen at
tænde lys.

Andre refleksioner?

intend lyset
Refleks! Håber!

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

lyset slukker automatisk efter
10 min hvor ingen er i
rummet - Smart huset

DIARY: DAY 3

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

yes!

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

Not at all, beside we had a sunny and bright day, Lucia helped a lot and we just use the lamp for around 2 hours before bed.

Did the daily challenge make you reflect upon how you normally use light in your home, and why you use it in that way? Did something surprise you?

Yes, most definitely. On how easy is to just press a button or else to have light, and I guess with most of the exercises or challenge the reflection is how we have "automatized" our movements.

Did the daily challenge affect the way that you normally spent your evening?

Not really, but obviously we were aware that we had a lamp.

Did the daily challenge affect any of your other routines in your home?

NO, and again I also believe it would have been different if it was winter and the sunset would have been earlier. Affecting dinner or cooking, etc.

Other reflections?

Ideas? If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.

JKV

DAGBOG: DAG 3

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja det lykkedes stort set. Lige et par små fejl hvor vi kom til at tænde badeværelseslyset. Det ligger i hånden at trykke på den kapp selv om man ikke må.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Ja det var hårdt at være uden lys. Også med madlavning og man skulle dele lampen, så hvis en skulle på toilet så var den i køkkenet uden lys. Vi havde selv tændt stearinlys også, det var faktisk hyggeligt.

Fik dagens udfordring dig til at tænke over, hvordan du normalt bruger lys i dit hjem, og hvorfor du bruger det sådan? Var der noget der overraskede dig?

Ja det har helt sikkert fået mig til at tænke hvor meget/mange lys der hele tiden er tændt i hele lejligheden, også når vi ikke er i et rum. Det overraskede mig faktisk hvor meget det betød for mig at der ikke var lys, jeg blev næsten deprimeret.

Påvirkede dagens udfordring den måde du ellers ville tilbringe din aften på?

Ja jeg var igang med et pudslespil, men blev nødt til at stoppe da det blev mørkt. Jeg havde virkelig lyst til at tænde lyset så jeg kunne pusle videre.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Ja, jeg tror det kan være en af grundene til at vi besluttede at deltage i en ~~og~~ silent disco party på vores vej. På en normal aften havde jeg sikkert ville pusle videre men da der ikke var så meget at lave i mørket så deltog vi og det er jeg rigtig glad for vi gjorde. Vi havde den bedste aften.

Andre refleksioner?

Vi skal helt klart blive bedre til at slukke lys der hvor vi ikke er. Nogle gange er lyset også tændt midt på dagen, hvilket virkelig ingen mening giver.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.



SH

DAGBOG: DAG 4

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja, næsten. Glemte flere gange, at min kaffemaskine er røkkemodstyr.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Ja, det var lidt svært. Mest fordi, jeg er så forvænt, så det med at skulle finde nye løsninger er lidt en udfordring.

Fik dagens udfordring dig til at tænke over, hvad de elektriske køkkenapparater betyder for dig i hverdagen?

Det betyder en del, men bliver taget forgiven.

Påvirkede dagens udfordring den måde du ellers ville lave mad på/tage opvask på, osv.?

Bestilte maden udefra i stedet for at lave det selv.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Kaffen var en udfordring. Har de ikke instant, så måtte koge vand på (el)køkkenfritte.

Andre refleksioner?

Der er virkelig mange være, jeg ikke tænker over.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.



RHV

DIARY: DAY 4

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

Not to a 100%.
We still use all
kitchen appliances
and charge our
laptops.

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

Yes! Specially in
the kitchen!
How many times
a day I cook
water, use tools,
etc. and also
for our laptop, is
like we a cordality
connected to the grid

Did the daily challenge make you reflect upon, what electrical kitchen appliances means for you in your everyday?

Yes! I want give
for granter our
water boiler and
blender no wire!

Did the daily challenge affect the way that you normally cook/take the dish, ect.?

to be honest, if
we would have
Follow the challenge
to a 100%, yes.
Our day would have
looked so different.

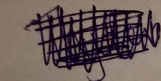
Did the daily challenge affect any of your other routines in your home?

It would have had.

Other reflections?

have to find
ways - back to
the old way -
to cook and
eat, we use
so many electrical
tools at home.

Ideas? If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.



PL

DAGBOG: DAG 4

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Nej. vi kunne
ikke lave kaffe
uden kaffemaskinen.
funktionerne.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Ja. KAFFE!!!

og opvaskeren
ville vi ikke undvære
igen.

Fik dagens udfordring dig til at tænke over, hvad de elektriske køkkenapparater betyder for dig i hverdagen?

De betyder meget
det bliver ret
klart!

Påvirkede dagens udfordring den måde du ellers ville lave mad på/tage opvask på, osv.?

Ja.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Ja.

Andre refleksioner?

Hvis vi havde
smarte ~~alternativer~~
alternativer
ville vi blive
"nødt" til
til at bruge dem
i stedet.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

uden blenderen.

Så god.



JHV

DAGBOG: DAG 4

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Nej. Vi holdt det næsten hele dagen. Vi brugte fx ikke el-kedlen men varmede i stedet vand i en gryde. Om aftenen havde vi købt ind til at lave humus, så jeg brugte blenderen til at lave den.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var svært. Man skulle hele tiden tænke over ikke at bruge dem. Vi bruger jo el-kedel, toaster, juicer og blender ret ofte. Og ja det viste sig så at vi ikke kunne klare os uden blenderen.

Fik dagens udfordring dig til at tænke over, hvad de elektriske køkkenapparater betyder for dig i hverdagen?

Ja, det fik mig til at tænke over hvor afhængige vi er af dem. Og hvor svært det ville være at lave nogle ting uden, som fx humus. Og hvor meget vi bruger dem.

Påvirkede dagens udfordring den måde du ellers ville lave mad på/tage opvask på, osv.?

Med morgenkaffen ja + ingen toast som jeg/vi normalt spiser ret ofte.

Det kunne have påvirket min aftensmad (humus) hvis jeg ikke havde snydt. Så havde det taget meget længere tid at skulle lave den i hånden og den var ikke blevet lige så god.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Andre refleksioner?

Ja, det fik mig til at tænke at man bliver vant til at have disse ting i hjemmet (jeg har ikke altid haft dem ~~til~~).

Og at man indretter sin hverdag efter at have disse luksusapparater, sådan at man pludselig ikke kan leve uden.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.



FB

DAGBOG: DAG 4

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Det syntes jeg egentlig
vi havde lige
været kaffe inden
i løste udfordringen
en derefter sik
et faktisk godt
g

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Nei -
et var ikke målrettet
om med lyset.

Fik dagens udfordring dig til at tænke over, hvad de elektriske køkkenapparater betyder for dig i hverdagen?

Jeg tænkte at jeg sikkert godt kunne undvære dem.

Vi har dog heller ikke så mange.

Påvirkede dagens udfordring den måde du ellers ville lave mad på/tage opvask på, osv.?

Nei

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

Den ville helt sikkert have været trøls med kaffeleveren.

Jeg forestiller mig at jeg ville have brugt Google til at finde ud af hvordan de bønner kan bruges.

Eller har vi Instant kaffe.

Andre refleksioner?

Vi forbruger slem
lidt meget på
unødvendige ting.
- kaffelevern f. eks.
- man kan kaffe
i hånden, og det
er lige så
nødigt.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Man kunne begynde at producere
ting til køkkenet der ikke er elektriske

DAGBOG: DAG 4

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke besvare spørgsmålene slevok.

Lykkedes det dig at fuldføre dagens udfordring? Hvis ikke - hvorfor?

Ja.

Fik dagens udfordring dig til at tænke over, hvad de ekstra køkkenapparater betyder for dig i hverdagen?

Hvis jeg havde lavet en termalsuppe eller gæringsuppe ville jeg ha fået brug for min støvblender, men tænker umiddelbart at den ikke slager så meget strøm.

Påvirkede dagens udfordring nogle af dine andre rutiner i hjemmet?

lavde min kaffe over gaskøfuret.

Andre refleksioner?

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Syntes ikke det var specielt svært, hvilket også skyldes at jeg ikke havde mad som

Påvirkede dagens udfordring den måde du ellers ville lave mad på/tage opvask på, osv?

Jeg valgte at køre opvaskemaskinen på et kort program og så skylder jeg alting

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, eller stikord ned i dette felt.

~~MA~~ RHV


DIARY: DAY 5

Use approximately 5 min. on writing down your reflections regarding your daily challenge. To make it easy for you, you can answer the questions below. However, you are welcome to add your own personal reflections.

Did you succeed in completing the daily challenge? (if not - why?)

NO! we try
so I'll say
succeed to a
small.

Was it difficult to complete the daily challenge? Why was it difficult/not difficult?

Yes! the hardest
of all. we flush
when we both
went to the toilet
to "Defecate".
Don't laugh! 
hanana said I
have water SHIT? -

Did the daily challenge make you reflect upon how you normally flush the toilet?

I guess more than
reflect on how
many times, I
am grateful to be
able to flush
every time that's
needed.

Did the daily challenge affect your toilet routines?

We used the
bucket technique
over the pi
and it was
an experience.

Did the daily challenge make you reflect upon what it means to you to be able to flush the toilet by 'merely' pushing a bottom?

we can only
be grateful for it
and really think
about the work
behind of the
"wall". what
means to treat
water for the
to go back to the
cycle.

Other reflections?

We both have
experienced different
toilets in
different countries
and, agreed that
there is so much
Room for Improvement
in the treatment
of gray water.

Ideas? If the challenge has given you any ideas on how you can be more aware of your everyday consumption, then please write them down in this box.



JKV

DAGBOG DAG 5

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Ja, igen næsten.
Min mand kom
til at skylle ud
én gang. Ellers
fuldførte vi
udfordringen.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Jeg synes ikke
det var så svært.
Det tog selv. ekstra
tid hver gang man
skulle skylle, fordi
man lige skulle bruge
2 min eller mere på
at fylde spanden.

Fik dagens udfordring dig til at tænke over, hvordan du normalt tømmer ud?

Ja normalt trykker
jeg bare på en knap.
Det er let og man
tænker ikke over det
bagved/læggende.
Altså at toiletet selv
fylder vand op igen,
altså det jeg skulle
gøre i udfordringen.

Påvirkede dagens udfordring dine toilet-rutiner?

Ja jeg skyllede ikke
da jeg bare havde
tisset, fordi det tog
så lang tid at fylde
spanden op.

Fik dagens udfordring dig til at tænke over hvilken betydning det har for dig 'bare' at kunne trykke på en knap for at skylle ud?

Ja, det gør at man
ikke tænker over hvor
meget vand man egentlig
bruger hver gang man
skyller, forundtagelsen at
man virkelig gerne vil
undersøge det. Ved selv
at skulle fylde spanden
med vand blev det
meget visuelt og synligt
for mig hvor meget vand
jeg bruger hver gang jeg
skyller ud.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Andre refleksioner?

Jeg har tænkt over
at jeg ofte skyller
ud på den store
knap også når jeg
bare har tisset.
Det er blevet en då
vane

DAGBOG DAG 5

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Kinda... Glemte det flere gange

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det var besværligt at fylde spandene og svært at huske andre vane

Fik dagens udfordring dig til at tænke over, hvordan du normalt tømmer ud?

Det er meget en vane/refleks at trykke på en knap.

Påvirkede dagens udfordring dine toilet-rutiner?

Det blev en del mere ~~besværligt~~ besværligt

Fik dagens udfordring dig til at tænke over hvilken betydning det har for dig 'bare' at kunne trykke på en knap for at skylle ud?

Jeg er meget privilegeret
"

Andre refleksioner?

Mangt af mit energiforbrug ligger i mine vaner/reflekser, og er ikke noget jeg tænker over - selvom jeg synes jeg er opmærksom på mit forbrug.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

DAGBOG DAG 5

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

Det lykkedes i hvert fald så længe jeg var hjemme ved mig selv.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

Det blev da til lidt mere arbejde at gå på wc.

Fik dagens udfordring dig til at tænke over, hvordan du normalt tømmer ud?

Nærmest ville jeg snide det det papir jeg pudser næse i i toiletet, men det gav jo ingen mening når det krævede så meget at skylle ud.

Påvirkede dagens udfordring dine toilet-rutiner?

Altså når man skal, så skal man, og så må man jo fylde spanden flere gange.

Fik dagens udfordring dig til at tænke over hvilken betydning det har for dig 'bare' at kunne trykke på en knap for at skylle ud?

Det er fantastisk bare at kunne trykke på en knap, det får en til at tænke over, hvor privilegeret op vi er.

Andre refleksioner?

Jeg tror at jeg endda brugte mere vand fordi jeg ville være sikker på at skylle alt ud i første forsøg, så fyldte spanden helt.

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

DAGBOG DAG 5

Brug ca. 5 minutter på at skrive dine refleksioner ned omkring dagens udfordring. For at gøre det lettere for dig er der opstillet nogle spørgsmål, som du kan svare på. Men du behøver ikke følge spørgsmålene slavisk.

Lykkedes det dig at fuldføre dagens udfordring? (hvis ikke - hvorfor?)

YES!

Fik dagens udfordring dig til at tænke over, hvordan du normalt tømmer ud?

JEG KOM
TIL AT VÆRE
EXTRA TAKNEMLIG
OVER HUR NEMT DER
NORMALT.

ikke...
tænker
mener skylles
ud!

Fik dagens udfordring dig til at tænke over hvilken betydning det har for dig 'bare' at kunne trykke på en knap for at skylle ud?

JA!
Rentigheden
har stor betydning

Andre refleksioner?

Der mangde
Vand er ikke
nødvendigt
hvis det kan
gøres på en
hyggelig
måde. vedh.

Var det svært at fuldføre dagens udfordring? Hvorfor var det svært/ikke svært?

NEJ, IKKE SVÆRT

MEN DET VAR
RIMELIGT IRRITE-
RENDE AT SKULLE
FYLDE DEN SPAND
OP.

Påvirkede dagens udfordring dine toilet-rutiner?

ET EXTRA STEP

ELLERS IKKE

Ideer? Har denne udfordring givet dig nogle ideer til, hvordan du kan blive mere bevidst om dit forbrug i hverdagen, så skriv dem/eller stikord ned i dette felt.

Hemmelighed
Patenteret :))