ENERGISE

EUROPEAN NETWORK FOR RESEARCH, GOOD PRACTICE AND INNOVATION FOR SUSTAINABLE ENERGY

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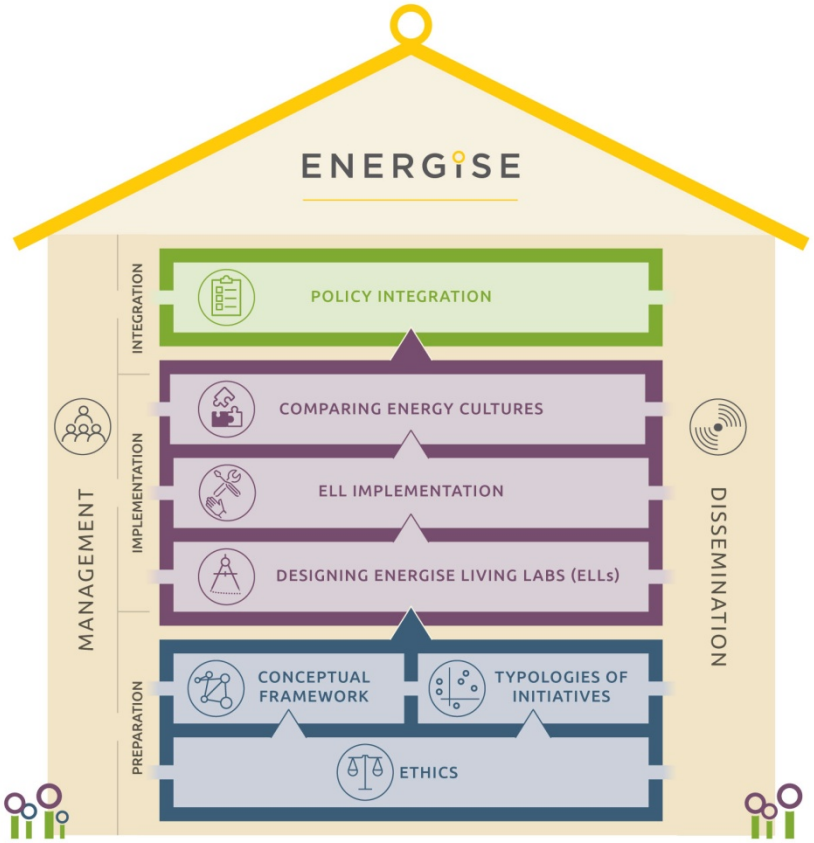
ENERGISE PROJECT

ENERGISE is an innovative pan-European research initiative to achieve a greater scientific understanding of the social and cultural influences on energy consumption. Funded under the EU Horizon 2020 programme for three years (2016-2019), ENERGISE develops, tests and assesses options for a bottom-up transformation of energy use in households and communities across Europe. ENERGISE's primary objectives are to:

- **Develop an innovative framework** to evaluate energy initiatives, taking into account existing social practices and cultures that affect energy consumption.
- **Assess and compare the impact** of European energy consumption reduction initiatives.
- **Advance the use of Living Lab approaches** for researching and transforming energy-related practice cultures.
- **Produce new research-led insights** into the role of household routines and changes to those routines towards more sustainable energy.
- **Encourage positive interaction** between actors from society, the policy arena and industry.
- **Effectively transfer** project outputs towards the implementation of the European Energy Union.



INTRODUCTION

This document is one of 30 national briefs, demonstrating key aspects of national energy supply and demand dynamics. Each brief is comprised of five sections:

Section 1 summarises the energy profile of the country. The section provides basic quantitative information of demand demographics and usage profiles, market trends and energy supply profiles, as well as qualitative reflections on current national energy policy. ***For all the briefs, the quantitative information is derived from ec.europa.eu/eurostat (2015 data), eea.europe.eu (2015 data), and climate-zone.com, unless otherwise stated.***[1] The qualitative reflections are based on a literature reviews and desk-research. References for the literature review and the desk-research are provided in footnotes or in section five.

Section 2 summarises the nationally based sustainable energy consumption initiatives (SECIs) that have been identified as part of ENERGISE WP2 framework (Jensen, 2017). Each SECI has been coded according to the Problem Framing Typology developed in ENERGISE WP2 (Jensen et al, 2017b).

Section 3 provides a *good practice* example of a national SECI that corresponds to category 3: “Changes in Everyday Life” or 4: “Changes in Complex Interactions” in the Problem Framing Typology. Please refer to Jensen (2017) and Jensen et al (2017b) for more information on the way the data for the good practice SECIs has been researched and documented.

Section 4 provides a brief summary of major nationally specific trends and their implication for energy consumption policies.

Section 5 provides an overview of sources used for qualitative assessments, and can be used as inspiration for further reading.

The national briefs provide contextual socio-material information for the further work to be carried out in Work Package 4, Work Package 5 and Work Package 6 in ENERGISE.

1.1 WP2: TYPOLOGIES OF ENERGY INITIATIVES

ENERGISE WP2 is a systematic criteria-guided review and classification of existing sustainable energy consumption initiatives from 30 European countries (EU-28, Switzerland, and Norway), which provides a comprehensive European database of energy initiatives involving households, and related typologies of sustainable energy consumption initiatives. This extensive synthesizing work guides the selection of Living Lab design elements for ENERGISE and future energy consumption research, policy and practice.

[1] Some piecharts will be empty, as no information is available.

This is done in order to

- Construct innovative typologies of sustainable energy consumption initiatives that can inform further research and action.
- Identify key success factors and related indicators, focusing on individual-level, collective, organizational, institutional and societal aspects of energy consumption, which will inform subsequent WP 3 (Designing Living Labs), WP 4 (ENERGISE Living Labs) and WP 5 (Capturing Energy Cultures).
- Progress the goals of the European Energy Union by creating a publicly archived open access dataset of sustainable energy initiatives across 30 countries in Europe.

Suggested further reading:

Jensen (2017) *Identification of key success factors and related indicators.* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.2.

Jensen et al. (2017a) *Establishment of a comprehensive open access dataset of sustainable energy consumption programmes and Interventions.* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.3.

Jensen et al. (2017b) *Constructions of typologies of sustainable energy consumption initiatives (SECIs).* ENERGISE – European Network for Research, Good Practice and Innovation for Sustainable Energy, Grant Agreement No. 727642, Deliverable 2.4.

Sources of quantitative statistics (unless otherwise stated):

Climate data:
http://www.climate-zone.com/continent/europe/

Demography data:
http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing

http://ec.europa.eu/eurostat/statistics-explained/index.php/Educational_attainment_statistics

Dwelling type data:
http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_population_by_dwelling_type,_2015_(%25_of_population)_YB17.png

Energy demand and supply quantitative data:
http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_consumption_in_households

Final energy consumption of households per capita data: https://www.eea.europa.eu/airs/2017/resource-efficiency-and-low-carbon-economy/household-energy-consumption

MWh conversion data:
https://www.unitjuggler.com/convert-energy-from-toe-to-MWh.html?val=893.9

DENMARK

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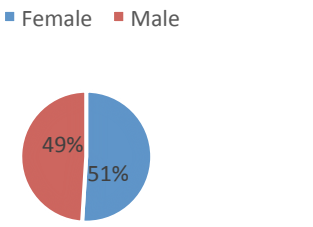
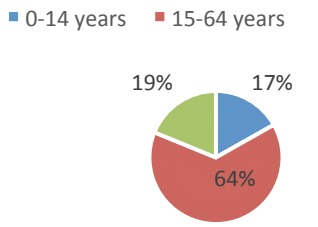
DEMOGRAPHY, ENERGY CONSUMPTION AND ENERGY SUPPLY

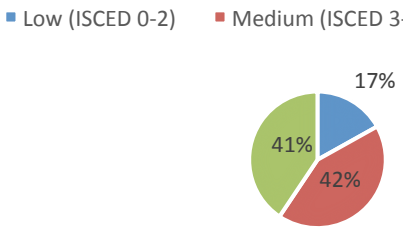
GENDER PROFILE



AGE PROFILE (2016)

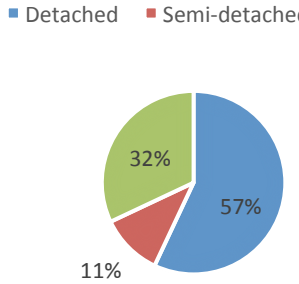


EDUCATIONAL PROFILE (25-54 Y, 2016)

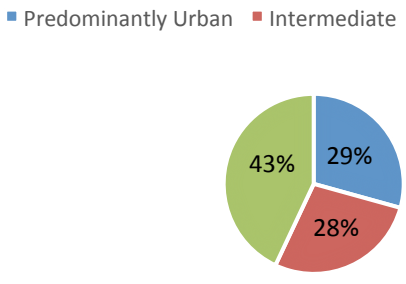


CLIMATE: temperate; humid and overcast; mild, windy winters and cool summers

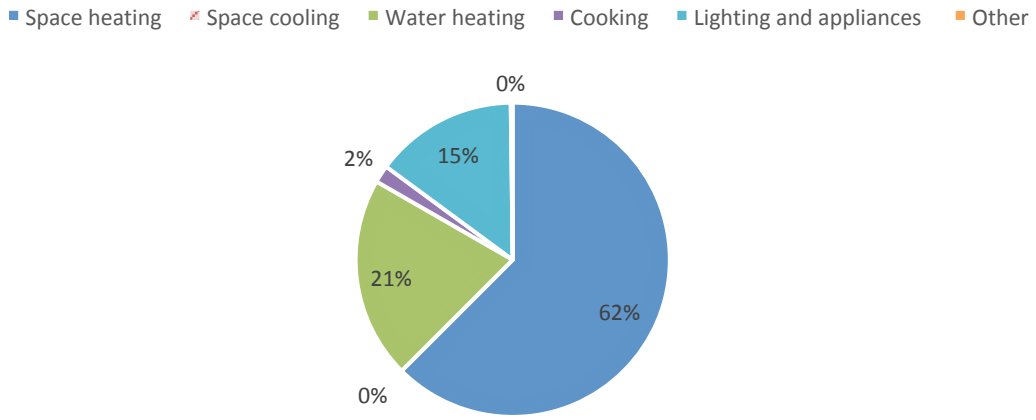
COMMON DWELLING TYPES (2015)



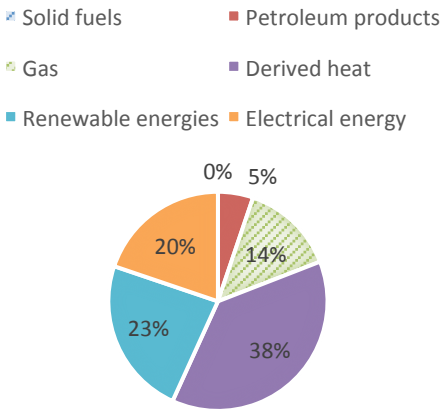
URBAN - RURAL DISTRIBUTION (OECD)



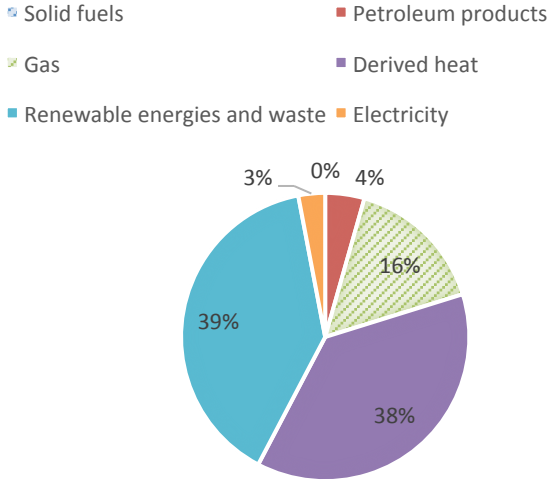
RESIDENTIAL FINAL ENERGY CONSUMPTION BY TYPE OF END-USE (2016)



SHARE OF FUELS IN THE FINAL ENERGY CONSUMP. IN THE RESIDENT. SECTOR (2016)



SHARE OF FUELS IN FINAL ENERGY CONSUMP. - RESIDENT. SPACE HEATING (2016)



FINAL ENERGY CONSUMPTION FOR HOUSEHOLDS, PR CAPITA (2015)

8.705 MWh

ENERGY SYSTEM AND ENERGY POLICY TRENDS

Energy system

Following the oil crises in the 1970s, the Danish energy system was radically changed. Since the country was dependent on oil imports and already had a large balance of payment deficit, the increase in oil prices sparked considerable efforts to save energy and reduce the dependency on oil imports. The introduction of nuclear power had been considered for some time and was promoted as a solution, but the public resistance was too strong, and the plans were shelved. Apart from replacing oil with coal in power generation, the most immediate and significant results on the supply side were achieved through improved energy efficiency based on heat planning. Due to a previous centralization process, nearly all electricity was produced by large central power stations, which were gradually converted to co-generation to provide district heating to larger cities. In addition, existing local district heating plants were converted to also generate electricity, and the number of decentralized CHP plants increased considerably. The number of local CHP plants today is about 400 (Dansk Fjernvarme 2018).

When the crises hit, the extraction of oil from the Danish part of the North Sea had just started. The production was small, but it was decided to establish a system that could make use of the related natural gas to replace oil in residential heating. Two collective pipe-based systems were thus established: direct provision of natural gas to households (and other sectors) and district heating based on CHP. Heat planning stipulated which areas should be supplied in which way. Both the electricity system and the CHP plants were by and large collectively owned by consumers or municipalities until about the year 2000 (Hvelplund 2007). Combined with legislation that allowed municipalities to commit consumers to connect to the collective systems, this form of ownership enabled a remarkable transformation to a more rational energy utilization. While about 25% of households were connected to district heating in 1975, the combination of district heating and natural gas to households grew to 43% in 1985 and 80% today: about 65% of households use district heating, while 15% are heated with natural gas (Wistoft el al. 1992: 204, Energistyrelsen 2018).

Encouraged by the oil crises, pioneers and popular movements took the first steps towards a modern utilization of wind power. This endeavour played a limited role in the first decades and met with considerable resistance from the incumbents, but from the 1990s wind power gained an increasingly important role in the system. In 2016 wind energy provided 37.5% of Danish electricity production (41.8% in 2015 and 1.9% in 1990), and this share is expected to increase significantly within the next few years (Energistatistik 2016). While wind power reduced the use of fossil fuels in electricity generation, oil still plays a key role in transport. The dependency on imports, however, fell as the oil production from the North Sea increased. The degree of self-sufficiency in total energy use grew from 5% in 1980 to 52% in 1990, and in 1997 Denmark became self-sufficient (Dietrich and Morthorst 2016). At the top in 2004, the degree of self-sufficiency reached 155%, but since then the production of oil and gas has fallen, and the degree of self-sufficiency fell to 83% in 2016 (Energistatistik 2016).

Security of supply was the main concern in the wake of the oil crises and encouraged conversion from oil to coal in power plants. When climate concerns later intensified, the phase-out of coal

emerged on the agenda. Local CHP plants developed the use of a variety of fuels including wood pellets, waste, straw, natural gas and biogas, and more recently, large power plants increasingly converted from coal to biomass. In 2016 43% of the biomass was imported (Klimarådet 2018).

In parallel with the technical transformation of the energy system, organizational changes have taken place. As in other EU countries, the system has undergone liberalization and privatization. Parts of the system are still owned by consumers or municipalities, but pressure on local budgets may lead to further privatization. To sum up, specific characteristics of the Danish energy system today are: the relatively high degree of self-sufficiency in energy, a high share of district heating based on co-generation, a high share of wind power, no nuclear power, considerable use of imported biomass.

Particular socio-material aspects that influence energy consumption

Considering the demand side of the energy system, the oil crises led to several initiatives. Regarding households, campaigns aimed at making people lower the temperature in dwellings and turn off lights. Considerable subsidies were given for thermal insulation and double-glazing, and building regulations were tightened. Later, compulsory energy labelling of appliances was introduced, and campaigns to shut off standby consuming appliances were carried out (Christensen et al. 2007). In spite of all the initiatives over the years, energy consumption has only stagnated and not directly decreased. Both population and living standards have increased, implying increased car ownership, more square meters per person, more appliances, more leisure travel etc. A specific Danish issue might be the relatively large housing stock from the 1960s and 1970s in need of thermal improvement. Due to globalization, part of the energy consumption related to Danish living standards has been outsourced. Interestingly, an opposite trend may be emerging, as Denmark presently attracts large datacentres because the high share of wind power serves to legitimize electricity use.

Current Trends in Energy Policy

Due to the relatively high share of wind power, smart grid solutions and flexible demand have attracted considerable interest since 2010, involving research and experiments. The smart grid concept concentrates on the electricity system, but it is increasingly acknowledged that this focus is too narrow. A low carbon transition must involve the coevolution of several other systems such as heating, mobility and agriculture. The discourse thus tends to change towards smart energy systems (Lunde et al. 2016). Across the political spectrum it is agreed that Denmark should be independent of fossil fuels in 2050. There are, however, many controversies regarding the strategies and policies needed to achieve this goal. Some of the controversies emerge from the private commercial interests that play an increasing role in the system. Examples of controversies are: How fast should the expansion of wind power take place? To which extent and how should government encourage the domestic use of electricity by promoting electric cars (Denmark has a very low penetration) and heat pumps? How important are energy savings, when the share of wind and solar power increases? Should the government subsidize energy savings? Is it acceptable to reduce electricity prices to encourage the use of electric cars and heat pumps, when this also increases electricity consumption for other purposes? Can electric cars and heat pumps be promoted in a more targeted way? To which extent should government promote investments in

cable connections to other countries? Is it acceptable that Denmark uses so much biomass, which is a limited resource globally? For which purposes is it acceptable to use biomass? To which extent is planning necessary to ensure a rational transformation of the energy system? Does it make sense to let wind power and solar power compete, or are both needed to balance the system? Should the duty to connect to collective systems be abolished? Should government invest more in research and development of smart energy technologies, e.g. storage?

Trends in national campaigns

For a long time, households have had access to various subsidies for energy savings, installation of solar panels and replacement of oil burners with heat pumps. However, the present right-wing government suggests to remove subsidies to households and concentrate on energy savings in business. At the time of writing (May 2018), the shape of the future energy agreement is not known.

OVERVIEW OF NATIONAL SECIS

Below please find a list of Danish SECIs that have been researched and documented through WP2 of ENERGISE. The SECIs are researched, selected and documented based on a set of requirements and research interests (please see Jensen 2017 for details). *The list should not be regarded as exhaustive or representative of all kinds of energy initiatives carried out in the country.*

Fløng: Neighbour-to-neighbour	 Changes in Individuals' Behaviour
ProjectZero - SpareKuffert	 Changes in Individuals' Behaviour
Eco-Life Høje Taastrup	 Changes in Individuals' Behaviour
Munksøgaard Community	 Changes in Everyday Life Situations
Insero Live Lab	 Changes in Individuals' Behaviour
Energy on Venø	 Changes in Individuals' Behaviour
My Climate Plan Middelfart	 Changes in Complex Interactions

Esco Light Middelfart	 Changes in Complex Interactions
Andelssamfundet i Hjortshøj (AIH)	 Changes in Complex Interactions
Innovation Fur	 Changes in Technology
AGA - elspare konkurrence	 Changes in Individuals' Behaviour
SpareFamilier	 Changes in Everyday Life Situations
For Enden Af Vejen	 Changes in Individuals' Behaviour
DIY for Boiligejerer	 Changes in Individuals' Behaviour
KlimaFamilier	 Changes in Everyday Life Situations
KlimaLandsbyen Studsgaard	 Changes in Complex Interactions
Kursus for Invandrerer og Flygtninge	 Changes in Individuals' Behaviour
AGA Energibesparelser for Indvandrere	 Changes in Individuals' Behaviour
Økosamfundet Dyssekilde	 Changes in Complex Interactions
Bydelsmødre Kolding	 Changes in Individuals' Behaviour
Samsø (and the energyacademy)	 Changes in Complex Interactions
BedreBolig Rådgivning	 Changes in Individuals' Behaviour

Svanholm (Hornsherred)	 Changes in Complex Interactions
ProjectZero - ZeroHomeModel	 Changes in Technology
Vækst via Energirenovering	 Changes in Individuals' Behaviour
SEAS NVE Grøn Forskel (social media)	 Changes in Everyday Life Situations
GrønPuls	 Changes in Complex Interactions
SAVE-E	 Changes in Individuals' Behaviour
RoskildeLampen	 Changes in Individuals' Behaviour
TransTownFuresø	 Changes in Complex Interactions
Model Søpassagen	 Changes in Everyday Life Situations
MCHA project	 Changes in Individuals' Behaviour
PSO 2003 standby consumption	 Changes in Everyday Life Situations
PSO 2006 Feedback	 Changes in Everyday Life Situations
Grundfos Living Lab	 Changes in Technology
Project Zero - ZeroFamily	 Changes in Individuals' Behaviour

‘GOOD PRACTICE’ EXAMPLE OF DANISH SECI

Klimafamilier Ballerup is characterized as a ‘Changes in Everyday Life type of intervention’. This is due to its (attempted) focus on co-creation and targeting multiple everyday life situations, within which families were challenged to change (performances of) practices. The SECI draws on several mechanisms related to ‘changing behaviours’, but, perhaps incidentally, practices were targeted.

Brief Description

This initiative ran in 2009, and the scope and aim was for 20 families to live as ‘climate-friendly’ as possible. The experiment was conducted over a year [8], but only effectively for 5 months in that period (Case, 2017). Some of the families continued after the experiment had officially ended. The initiative had a broad range of focus areas, such as transportation, food consumption, heating and waste, and included energy- and water consumption in general. The initiative included 20 families comprised of people from different age-groups in Ballerup Municipality, where the main type of housing was ‘one-family houses’. 4 out of 20 participating households were tenants, the rest owner-occupiers. An important aspect of this initiative is that families/residents were very active in designing the methods of the initiative, but this was only the case in the second half of the initiative. Ballerup Municipality financed the project (Information, 2014)

Contextualization

The SECI was established as part of Ballerup Municipality’ engagement in the ‘Green Cities’ cooperation (Papazu, 2012). In 2009 they had committed to reducing the citizens co2 emissions by 26% and they have a history of promoting sustainability within the municipality as well as the local businesses (Ballerup Bladet 2016). This SECI seems to target ‘way of life’ rather than targeting energy and water consumption as something in itself. The citizens/families involved in the initiative were however already committed to wanting to do something for the environment, and may therefore not represent the average of the Danish population.

Aims and objectives

It was an aim to involve families that would represent the general configuration of citizens in Ballerup. This is explained as possible due to the fact that tenants (feel that they) have less control over the households energy-use (Case, 2017). The goal was to target residents’ everyday life and routines and thus what they could themselves change in their everyday life. It seems that these behaviours were targeted by addressing what could be conceptualized practices (and practices are also mentioned as the target for change), but only the performance of these practices seem to have been targeted (food-related practices, mobility, practices that generate waste). The goal was to engage the involved citizens in reaching the municipal goal of a 26% reduction in citizens’ CO_2 emissions.

Methods for intervention

The initiative had 2 phases; in the first phase, the families should work with changing habits in terms of energy consumption, and they were given energy saving equipment, which included LED bulbs, ‘shower-alarms’ (to monitor the length of the shower), tools for measuring energy consumption, and energy saving power strips (Papazu, 2012). The families who further worked with mobility received a bike trailer, and the families who worked with food, received vouchers to a local organic food supplier (Papazu, 2012). All families received an energy-assessment of their homes, based on which they were

advised about how they could change certain habits related to their energy use (Case, 2017). The families were asked to measure their consumption every week. By the end of the first half year, the families had reduced their consumption within their target areas 20%, almost the target of the municipality (Papazu, 2012). The second half year of the project, half of the families continued, and in this phase of the project, the families were to co-create the projects scope and aim, and in this phase, heating and waste were added as target areas. Apparently, this phase was confusing, as it had not been clear to the families that they were to develop parts of the project themselves (Papazu, 2012). The families developed various advices for energy saving based on their experiences and they actively contributed to developing an electronic sheet for registering energy consumption. They also arranged for 'study trips' to waste incineration plant, and made a cookbook. 'Klimafamilier's' approach is characterized as one of many in the emergent tendency to design object- and project based climate initiatives in DK, rather than solely basing campaigns on information (Papazu, 2012).

Steps of implementation

First Phase (½ year): energy assessment and different energy-saving tools + monitoring of consumption every week. Everyday life and practices related to water and energy consumption was targeted, as well as food and mobility. Families reduced CO_2 emissions by 20% after that period of time. Families enrolled from beginning, but in 1 phase mostly in terms of time and engagement. Second phase (½ year): families co-designed next phase in terms of scope and methods. Heat and waste foci were introduced here, and families made a cookbook and disseminated their experiences to other citizens. There is no record of what this resulted in (energy consumption and co2 emission wise). The project ran in 2009. In 2012, 7 families were still active, but with low and hesitant engagement (Papzu, 2012).

Results/outcomes

The families obtained a 20% reduction in their CO2 emissions after the first half year. Some families obtained a 25% reduction in the energy consumption. The family's engagement with bike-trailers, shower-alarms, electricity consumption measuring tools etc has helped this reduction. Levels of consumption (energy and water) were reported on. It is not known if changes representations of everyday life happened. But it must be presumed that (some) families managed to shower for shorter intervals, and food sources for meal preparation and maybe even configuration of meals have changed (ie the access to organic food, and the resulting cookbook). Notably it was only some of the municipality's most resourceful families who stayed in the experiment for the longest time (Papazu, 2012). No official evaluation or consultancy reports were developed (Papazu, 2012). The project was also closed in 2012, and it is not known whether families stayed on track with lower consumption levels.

The role of the households

20 families were involved in the initiative, including people ranging from the age of 2-74 years. The families were actively involved in the initiative, and the second part of the initiative focused on having the families co-designing objectives and methods. Several activities were included in the initiative, such as challenging shower time, energy efficiency in general, promoting biking and dealing with matters of heating, waste and food. The families did not (have to) contribute financially. As the families co-designed the 2 phase of the initiative, the families' inputs mattered a lot in the design and development of the initiative. The families were however a bit confused about the 2 phase, as it had not been clear that they were to take part in the development of the project. Further the project was

not evaluated (Papazu, 2012). The initiative included a lot of material to help challenging routines. Although not a precondition for being enrolled in the project, a lot of the families had environmental concerns already prior to the project (Papazu, 2012).

Location

The initiative took place in Ballerup Municipality, located close to Copenhagen. The initiative was initiated by the municipality's' technical and environmental administration, due to the municipalities engagement in the Green Cities network. It seems that the local framework/scale of the initiative was important to some of the families, more so than the climate/environmental dimension of the project (Papazu, 2012).

Was/is the initiative successful?

The families almost reached the target for lowering CO_2 emissions through the 1 phase of the project. In that case, the initiative must be regarded as a success according to the set target. The project was however dissolved, and the remaining families showed hesitant engagement towards the end. The families, who saw the enrollment in the initiative as a matter of saving money, left the initiative after the 1 phase, where the objectives had been meet (Papazu, 2012).

Textual and communicative aspects of initiative

Families who left the initiative were termed 'defector-families' (Papazu, 2012). Some of the families had monitored their energy consumption, prior to enrollment in the initiative, but for monetary reasons. After enrollment in the project, it became about 'co2 emissions' and 'saving the planet'. It seems that the municipality/the project coordinator is problematizing and challenging the nature of everyday life, through which the families became heavily involved in experimenting with and showcasing different versions of everyday life. Some families saw their engagement as a means to reduced costs. They left the project, when monetary goals were reached. Families, who remained part of the initiative, for other reasons than monetary reasons, still used monetary results as a pedagogical tool to reach other citizens. CO2 reductions and the need for these reductions were heavily communicated by project-leader. There seem to be a notion of 'us and them' – both in terms of differences in knowledge and experience between the Klimafamilier and the rest of the citizens, when the families try to share their experience in a wider audience. Also, it seems that people outside of the project found it a bit 'funny' or they don't really take it seriously. Also, the project coordinator seemingly rejected the idea of turning the Klimafamilier into a network or association/club – which was something that some of the families would have liked. The project coordinator seemed to think that there were no grounds for doing that (implying that a potential socially shared engagement would be tiresome and not in fact productive) (Papazu, 2012).

The physical/technological aspects of the initiative

The tool for registering energy and water consumption was a key tool, and became an important material element in the initiative, but some families found it inappropriate, since it was not clear what was measure; e.g. numbers of flushes in the toilets were to be accounted for, but it was not clear what that meant in terms of litres of water. That discouraged some participants, where others found it motivating that the registration sheet was complicated and had to be complete (Papazu, 2012). Several material elements were introduced, such as bike-trailers, LED bulbs, energy saving power strips, shower alarms. The materiality of the initiative seems to have been important. It does however mostly seem like participants were asked to reduce certain things, and not to stop using certain things. Yet, in terms of mobility and food, practices seemed to change, at least for a while,

due to the material interventions (bike-trailer and access to organic food, through vouchers). The size of the household does not seem targeted. No big changes in physical layouts, and it does not seem that that there was focus on repairing and/or sharing.

Shared understandings related to initiative

In this SECI it seemed that a lack of shared understandings had important implications; the project coordinator/the municipality's focus on citizen involvement contrasted why many of the families enrolled in the project – to do something. A lot of the resourceful families were used to a different way of approaching a project, primarily from their own work-cultures, that contrasted the municipality's focus and 'softer' facilitation and attention to make sure that families attended meetings, according to source (Papazu, 2012). The contrasting ways of viewing the intention with the project almost killed the participating families engagement. This goes to show that initiatives may really have to take point of departure in where participants 'are' and what they want to do, from the beginning.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

The Danish SECIs, showcased in section 2, reflect a range of aspects from the historical development in national energy policy and socio-material aspects of energy consumption. Indeed, they show tendencies in how energy consumption has been understood and targeted as part of national and local policy initiatives over time. Most of the showcased SECIs reflect tendencies in targeting behaviours related to lighting and heating, such as turning off light you are not using, or turning down the temperature at home. Some SECIs promote energy efficiency through refurbishing, or by choosing energy efficient products. Some of these SECIs are traditional in terms of informing and enabling the householder towards more energy efficient homes; an approach which to a large extent was initiated in the 70ies in relation to the oil crisis. Examples of these are AGA Elspare Konkurrence and For Enden af Vejen. Other SECIs, with a more 'systemic' approach reflect current trends in smart grid and smart city developments, such as Eco-Life Høje Tåstrup, MCHA Project, Insero Live Lab and Grundfos Living Lab. These trends are in some cases reflected in national energy policy visions, but as smart-grid ideas are still mostly experimental and research-based, they are not yet explicitly included in national energy policy. Lessons learned from some of these initiatives, however, seem to be included in broader visions within energy policy, where the 'consumers' are expected to be flexible in the way they use energy, but other than this, the householder is becoming less and less 'visible' in plans for energy savings. Subsidies to home-renovations are threatened by cuts, and national policy seems to go more in the direction of systemic and business savings.

Interestingly, most of the Danish SECIs reflect more local policies in relation to energy and climate change. In Denmark, all municipalities have local plans for energy and climate, and several of the SECIs reflect projects related to these. This includes several of the eco-communities, Klimafamilier Ballerup, Sparefamiler, My climate plan Middelfart, Project Zero and SAVE-E. Several of these SECIs are partly research based, partly local initiatives. These SECIs often involve householders actively in various ways. Some of these SECIs, including the 'good-practice' SECI described (KlimaFamilier) target everyday life activities, or complex interactions between several people and practices. This often

includes other kinds of resource consumption such as food, water, and waste generated, and not only energy consumption. Most local SECIs are very different in approach and scope, and where some enable alternative ways of living (Munksøgaard, Svanholm, AIH), others reorganize existing professional practices within local banking, craftsmanship and energy renovation (My Climate Plan Middelfart), and others again target particular aspects of everyday life within the households and between a selection of households (Model Søpassagen, Sparefamilier, Klimafamilier).

Common for these 'local' SECIs are that they are much 'broader' in their scope and approach, than national energy policy. Although it is difficult to say anything about the success of these SECIs (in quantitative and qualitative terms), as they are evaluated very differently, if at all, it seems that several of the local SECIs (particularly those that systematically address and rearrange particular aspects of everyday life across practices (also professional practices) are rather successful in arranging new partnerships and reducing energy consumption. Particularly the eco-communities have significantly lower co2 emissions in comparison to the average Danish emission in ton/capita/year (Nyt Fokus, 2015). Common for them, though, is that they often run into problems with nationally induced legislation and standards that make systemic change difficult. Therefore, local SECIs are not always offered the needed support from national policy. A focus on a stronger relationship between national policy and municipal strategies might be favorable, and money and time set aside for properly evaluating projects seems to be needed. This includes funding for researching and establishing grounds for developing appropriate evaluation schemes.

REFERENCES

Christensen, T.H. et al., 2007: Greening the Danes? Experience with consumption and environment policies. Journal of Consumer Policy 30: 91-116.

Dansk Fjernvarme, 2018: http://www.danskfjernvarme.dk/viden-om/fjernvarmeinfo

Dietrich, O.W. and Morthorst, P.E., 2016: Danmark – energiforsyning. In: Den Store Danske, Gyldendal, http://denstoredanske.dk/index.php?sideId=70753

Energistatistik, 2016: https://ens.dk/sites/ens.dk/files/Statistik/estat2016.pdf

Energistyrelsen, 2018: https://ens.dk/ansvarsomraader/varme/information-om-varme

Hvelplund, F., 2007: Fra fælleseje til fjernejerskab og monopolkontrol. In: E. Christensen and P. Christensen (Eds.): Fælleder i forandring, Aalborg Universitetsforlag.

Klimarådet, 2018: Biomassens betydning for grøn omstilling. http://www.xn--klimardet-b3a.dk/sites/default/files/downloads/klimaraadet_biomassens_rapportno4_digi_01.pdf

Lunde, M., Røpke, I. and Heiskanen, E., 2016: Smart grid: hope or hype? Energy Efficiency 9: 545-562.

Nyt Fokus, 2015: http://nytfokus.nu/nummer-4/oekosamfund-som-fremtidslaboratorier/

Wistoft, B., Thorndahl J. and Petersen, F., 1992: Elektricitetens Aarhundrede. Dansk elforsynings historie. Bd. 2. 1940-1991. Danske Elværkers Forening.

References for Good Practice SECI Description:

Ballerup Bladet, 2016 http://ballerupbladet.dk/node/27607

Ballerup Grønt Regnskab 2010. http://www.dn.dk/media/7008/ballerup_groent_10-web.pdf

Case, 2017. unpublished case-descriptions.

Information, 2014. https://www.information.dk/indland/2014/10/klimapolitikken-kommer-borgerne

Nyt Fokus 2015a: http://nytfokus.nu/nummer-5/borgerdrevne-klimaprojekter/

Papazu, I. 2012. ”Ballerup Kommune skal jo ikke redde den sidste pingvin!” Master Thesis, Published. http://klimakonsulenten.info/assets/Uploads/PDF-Speciale.pdf