

ENERGISE

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

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NORWAY

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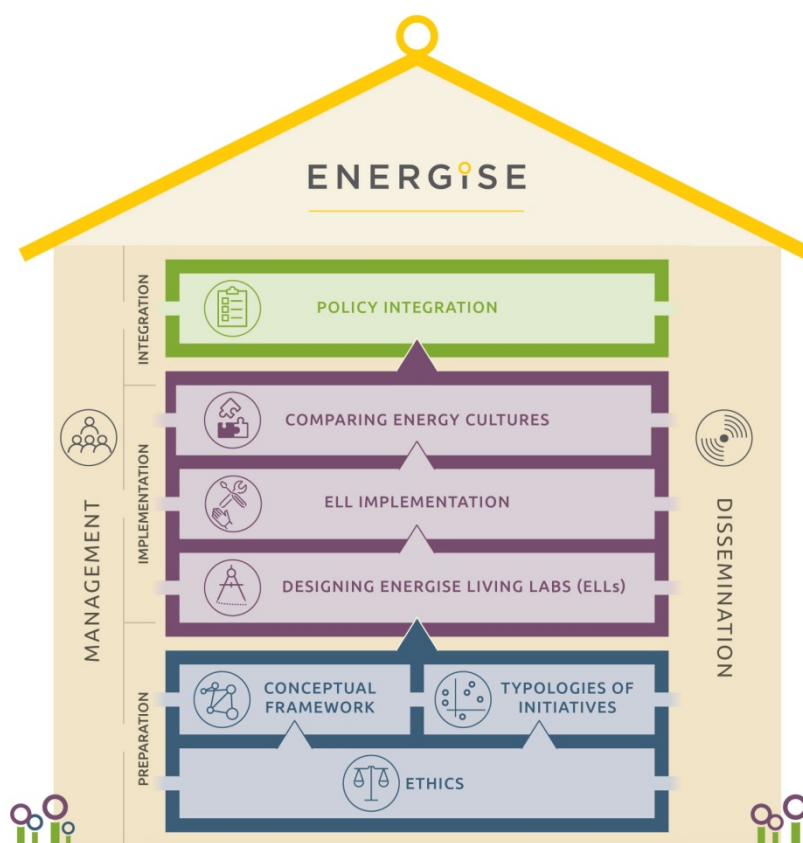
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ENERGISE PROJECT

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.europa.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 (SECI) 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_\(%25_of_population\)_YB_17.png](http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_population_by_dwelling_type_2015_(%25_of_population)_YB_17.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>

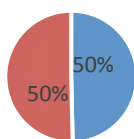
NORWAY

Authors: Renda Bellmallem, Tomislav Tkalec

DEMOGRAPHY, ENERGY CONSUMPTION AND ENERGY SUPPLY

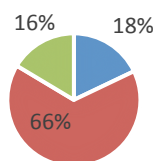
GENDER PROFILE

■ Female ■ Male



AGE PROFILE (2016)

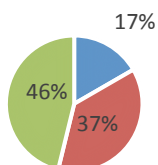
■ 0-14 years ■ 15-64 years ■ 65+ years



CLIMATE:
temperate along coast, modified by North Atlantic Current; colder interior with increased precipitation and colder summers; rainy year-round on west coast

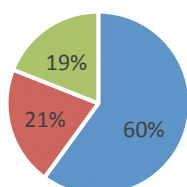
EDUCATIONAL PROFILE (25-54 Y, 2016)

■ Low (ISCED 0-2) ■ Medium (ISCED 3-4) ■ High (ISCED 5-8)



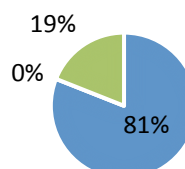
COMMON DWELLING TYPES (2015)

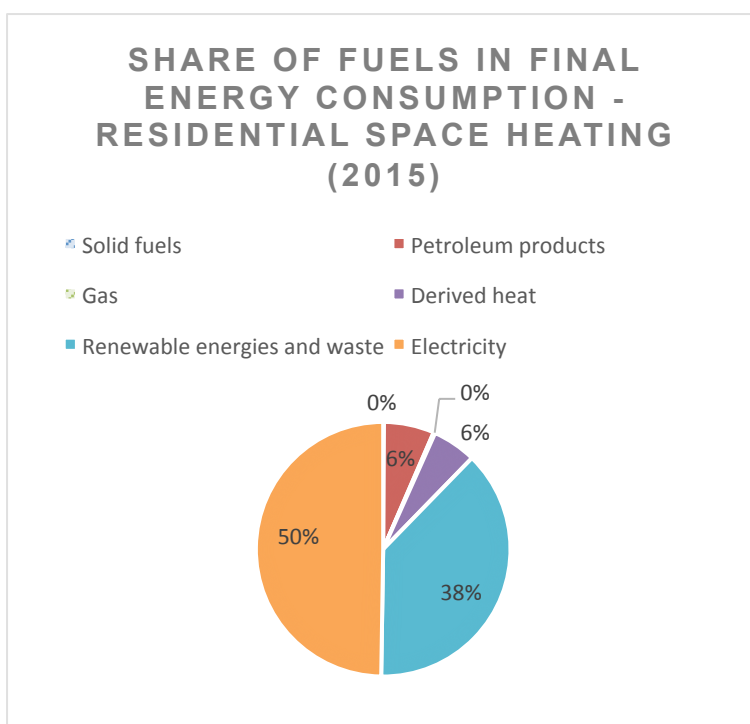
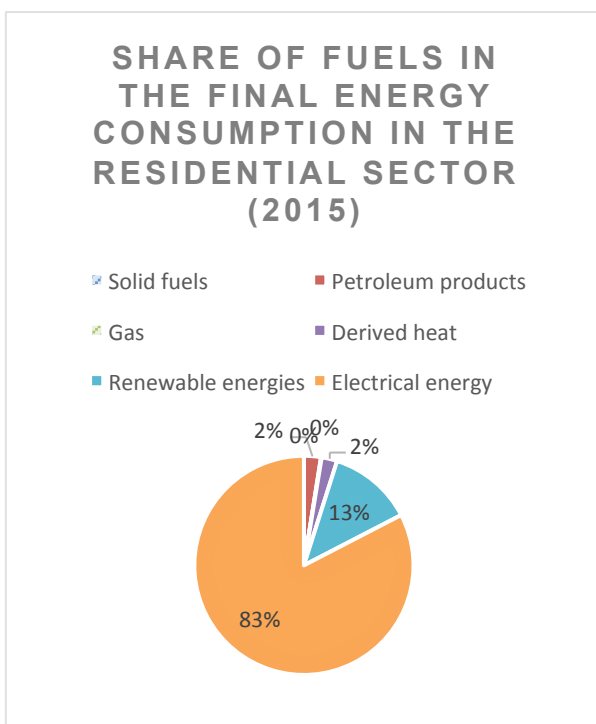
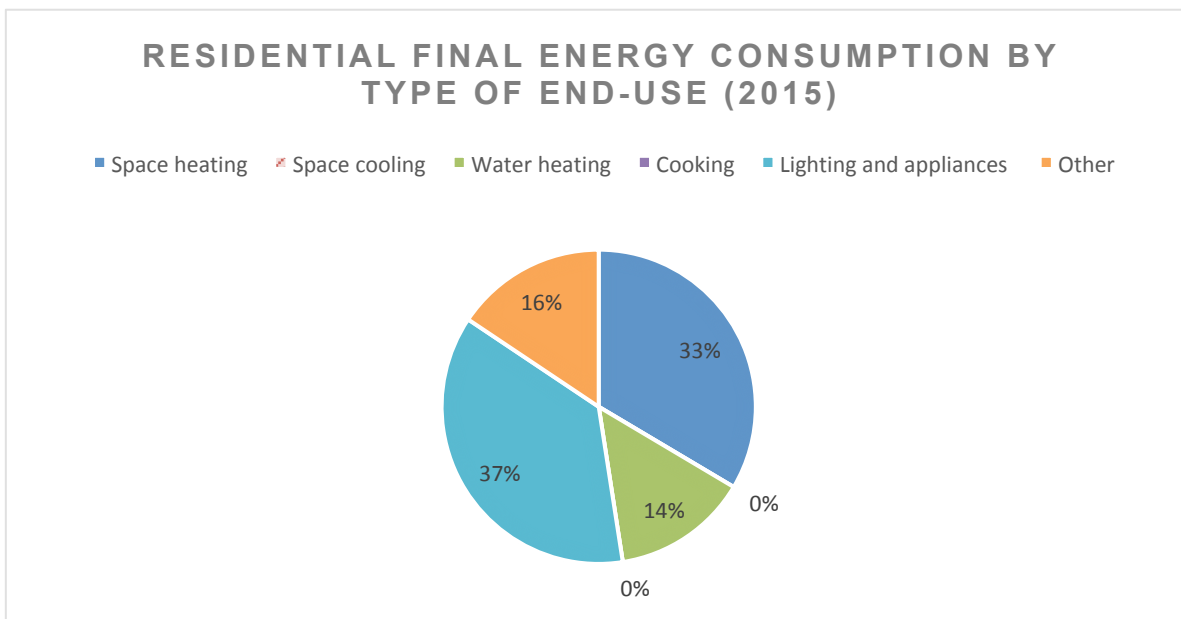
■ Detached ■ Semi-detached ■ Flat



URBAN - RURAL DISTRIBUTION (WORLD BANK)

■ Predominantly Urban ■ Intermediate ■ Predominantly Rural





ENERGY SYSTEM AND ENERGY POLICY TRENDS

Energy System

The energy sector is a major sector of the Norwegian economy. The country has vast oil deposits that were discovered in the late 1960s. Norway's proven oil reserves were estimated at 1 billion tonnes at the end of 2015 (8 billion barrels), or 11.3 years of production at the rate of 2015. These reserves ranked Norway at 19th worldwide with 0.5% of the global total. Statoil is the national oil company. Norsk Hydro and Saga Petroleum have drilling and production rights

In 2015, Norway is the seventh largest producer and third largest exporter of natural gas. Natural gas reserves were estimated at 1 900 billion m³ at the end of 2015 (65.6 trillion US cubic feet), or 15.9 years of production at the rate of 2015. These reserves ranked Norway 16th in the world.

Norway is a net exporter of coal. In 2008, it produced about three times more than it consumed. Norwegian coal production comes from two mines on Spitsbergen, the main island of Svalbard. The country has reserves on the Norwegian continental shelf (estimated at 3 trillion tons). But, its reserves are difficult to reach and are currently not economically exploitable.

Fossil fuel explorations have been launched in the Barents Sea and in the Arctic by Norway. These surveys are debated because of their disastrous climate consequences. However, environmental concerns were placed secondarily due to the peak of Norwegian production in 2000 and the need to find more resources to pursue economic growth.

Regarding renewables, Norwegian electricity is almost exclusively produced by its hydroelectric dams. The country was the 6th largest hydro-power producer in the world in 2014. Depending on the annual rainfall, it can represent up to 99% of the country's electricity. Thermal generation ranked second with 4.7 TWh. The Norwegian electricity grid is operated by the state-owned company Statnett. Since 2008, the Norwegian and Dutch power grids have been connected by NorNed, a 580 km submarine DC cable, making it the world's longest submarine power cable.

Solar energy is also used (companies Scatec Solar and Rec Solar who also work abroad). Regarding wind power, the country is third with 1 TWh. The potential is strong, especially off-shore. The state-owned energy utility Statkraft built Europe's largest onshore wind farm in the vicinity of the city of Trondheim in central Norway. This renewable project represents an investment of 1.1 billion euros.

Between 1990 and 2012, marine chemical releases from oil exploitation are estimated at between 100,000 and 200,000 tonnes per year, depending on the year. Of this total, the vast majority (70% in 2012) is related to drilling actions. Extraction activities are also responsible for oil spills. In the first 40 years of Norwegian oil production, a total of 16.3 m³ of oil was reported to be spilt.

Particular socio-material aspects that influence energy consumption

Primary energy consumption in Norway is three times higher than the world average and electricity consumption is 7.6 times higher than the global average. This is due to the presence of electro-

intensive industries such as aluminium plants, attracted by the availability of low-cost electricity.

In 2014, registrations of electric vehicles in Europe reached 65,199 units, of which one-third were in Norway. In Norway, electric cars accounted for 12.5% of total registrations, thanks to particularly strong incentives: tax exemption registration tax (around € 11,500) and VAT, toll free driving, parking, ferry, free charging in public car parks.

In addition, municipal buildings must be built according to the passive building standard since 2014. Public lighting is serviced by LEDs and district heating is serviced by heat pumps.

Current Trends in Energy Policy

Norway is one of the five Arctic border states (along with Canada, Denmark, the United States and Russia), strengthening its military and strategic presence in order to advance its interests. The significant presence of fossil energy resources in the Arctic combined with a rapid melting of the pack ice makes it a geopolitical priority of importance for Norway. The Arctic would contain about 13% of world oil reserves and 30% of gas reserves. An important investment program for the "Far North" has been in place since the mid-2000s, and millions of euros have been spent on this program by the Norwegian government. Norway operates the remaining third of its natural gas reserves, most of which are located in the Arctic regions.

Norway voted in 2016 a resolution that advances from 2050 (date set by the Paris Climate Conference in 2015) to 2030, the goal of reducing to zero the net volume of greenhouse gas emissions. Electricity predominantly from hydropower is a point that goes in the direction of this objective. Intensive fossil fuel farms are the main source of greenhouse gas emissions in Norway. To achieve the target, it would be appropriate to stop, or at least reduce, the extraction of hydrocarbons.

However, Norway does not pollute less for achieving this objective, it buys offset credits abroad ("quotas") within the framework of the carbon neutrality and the carbon credits market of the Kyoto protocol. Norway, although the largest producer of oil in Western Europe, wants to be at the forefront of the fight against climate change because of these kind of policies. It is one of the first countries to have established the carbon tax. Part of the oil fund is invested in companies that are dedicated to renewable energy. It should be noted, however, that Norwegian greenhouse gas emissions are gradually increasing, due in part, to the entry into operation of a new oil field in 2015.

Trends in national campaigns











Since 2012, Norway, together with Sweden, has been issuing green energy certificates to encourage the use of renewable energy (wind, wave, solar, geothermal, biomass, hydroelectricity) by consumers and electricity producers.









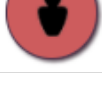
National programs and campaigns focus mainly on energy efficiency measures, renewables and e-mobility for various target groups. Non-state actors are running campaigns for energy transition and there is a strong grass-roots movement of community energy initiatives and energy cooperatives.

Campaigns and initiatives are run by different stakeholders: national institutions, research institutions, NGOs and other actors, and can be divided in national/regional programs, European projects and local initiatives. Initiatives that were identified by the ENERGISE team are partly reflecting the trends from energy policies. On the other hand there are campaigns from civil society that are trying to persuade the Norwegian government and companies to go out from the fossil fuels business.

OVERVIEW OF NATIONAL SECIS

Below please find a list of Norwegian 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.

4RinEU : Robust and Reliable technology concepts and business models for triggering deep Renovation of Residential buildings in EU		Changes in Complex Interactions
TOPTEN ACT : Enabling consumer action towards top energy-efficient products		Changes in Individuals' Behaviour
Instigating Simple Energy Efficient Behavioural Practices in Schools (FLICK THE SWITCH)		Changes in Individuals' Behaviour
European Smart Metering Alliance (ESMA)		Changes in Technology
European Solar Days II (ESD II)		Changes in Technology
Creating Actions among Energy Conscious Children (KIDS4FUTURE)		Changes in Individuals' Behaviour
Evaluation of Energy Behavioural Change Programmes (BEHAVE)		Changes in Individuals' Behaviour
Integration of Active Learning and Energy Monitoring with School Curriculum (ACTIVE LEARNING)		Changes in Individuals' Behaviour
Residential Monitoring to Decrease Energy Use and Carbon Emissions in Europe (REMODECE)		Changes in Individuals' Behaviour
The Energy Path: an e-learning platform for education of the new generations in the sustainable energy field (ENERGY PATH)		Changes in Individuals' Behaviour

TOGETHER on the move - Energy Efficient Transport training for immigrants (TOGETHER)		Changes in Everyday Life Situations
Oljefri (oilfree)		Changes in Technology
ZEB Pilot House		Changes in Technology
A Transnational Nordic Smart City Living Lab Pilot		Changes in Technology
Klimaløftet – Norway's public support to act on CO2		Changes in Individuals' Behaviour
Terra Libera Økogrend project		Changes in Complex Interactions
HURDAL SJØEN ecovillage		Changes in Complex Interactions
Energismart		Changes in Individuals' Behaviour
SUSTAINCO (Sustainable energy for rural communities)		Changes in Individuals' Behaviour

'GOOD PRACTICE' EXAMPLE OF NORWEGIAN SECI



HURDALSJØEN ecovillage

Brief Description

Hurdalsjøen is a first eco-village in Norway. It consists of three parts: a housing cooperative consisting of energy efficient building made from natural materials. The second part is a living farm, which provides the community with fresh and local produce. The third part of the complex is organic nutrition centre. There are in between 400 and 500 people already living in the village or are moving there shortly. The focus is on sustainability and quality of life. 130 new housing units will come on sale in the next few years.

The legal form chosen is that of the cooperative. After the acquisition of the farm, the ecological village cooperative was responsible for covering the running costs, while the village was being designed. Once the first houses were built, a housing cooperative was created. Its members must also be members of the ecological village cooperative. The reason for this choice was the principle of "one person / one vote".

Brief Contextualization

The ecological village of Hurdalsjøen was born from a larger movement that sought a suitable place to create an ecological village in the late 1990s and early 2000s. People who settled in the ecological village of Hurdalsjøen are from this movement. It brought together a few families who saw in Hurdalsjøen an ideal place to settle. The concept of eco-villages is been implemented in various places across the Europe and the world, so it is not unique in any sense. There is a local awareness about the importance of adapting your lifestyle in order to achieve a more sustainable outcome.

Aims and objectives

The overall objective or vision is an ecological village that is respectful of the environment, which privileges local activity and a democratic mode of operation, where people of all lifestyles can cohabit. The project aims to create on-site businesses by encouraging local jobs, by developing activities such as a farm, a small grocery store, and a kindergarten. It also aims to minimize the ecological footprint of the village population (housing, food consumption, etc.), and to target social inclusion and social democracy in the organisation of activities in the village (cooperative decisions, democracy, consensus, inclusion). Finally, the project aims to be an example and inspire other similar initiatives.

Methods for intervention

Method of intervention in Hurdalsjøen is co-creation. Interested people come to live in the community and co-create the realities of it via a democratic decision-making process. Beforehand people are being educated about the sustainable living in an ecovillage, where they are provided with the information in order to facilitate the common understanding of the life in Hurdalsjøen.

Steps of implementation

Hurdalsjøen was established in 2002 and the first temporary houses were built in 2003. The group worked with experts in the fields of architecture, sanitation, agriculture, energy, and with local authorities. This was not only for housing planning but also for a national training centre, a crèche, and a research and presentation centre for renewable energies. In 2010 they built the first 28 units of housing and nursery, as planned. The houses were partially designed by the village group. The dwellings have developed new standards and use only non-polluting materials and modules, which allows different uses. Some of these units are rented but most are owner occupied.

Results/outcomes

There hasn't been any measured reduction in energy consumption or emissions reduction as there are no norms of reporting. What has changed in the lives of people that moved to the village is that the whole infrastructure of the village supports their sustainable lifestyle. In particular it lowered their energy consumption, since they live in more efficient buildings.

The role of the households

Households have been heavily involved in the initiative. The households have been part of designing the initiative and are involved in its activities on a daily basis. The initiative has definitely developed based on the feedback from people/households, since decisions are being made in a very democratic way (one person one vote). Households contributed financially in that they bought the house in the eco-village. They are also members of a food co-operative.

Location

It is situated 100 km North of Oslo. People who were searching for a new location find it suitable for housing and farming. Families or individuals (households) that want to move to Hurdalsjøen need to first go through the education process, which can be a sign of selection. We can say that there are spillover effects into the local society, since the municipality where they are situated decided that Hurdal will seek become a sustainable valley and try to become carbon neutral by 2025. There is also a sustainable festival organised in cooperation between eco-village and municipality. The initiative focuses on sustainable lifestyles form a very comprehensive approach. The main focus is on sustainable buildings although they never mention energy efficiency, but rather natural materials from which the buildings are made. The other focus is sustainable food production and consumption. They also seek to develop a sense of community with communal meals, community managed childcare, and community spaces that are shared.

Was/is the initiative successful?

The initiator does not explicitly state whether the initiative is successful or not. However it does give an evaluation of how successful the initiative was in creating local jobs. It is stated that it is still too early to assess the impact on job creation or employee retention. However, the current construction of housing and nursery, the future development of a grocery store and a small café create a favourable environment for job opportunities. The initiative offers people an opportunity to live a more sustainable life, without compromising their quality of life. It offers an alternative to living in a consumer driven environment. A part of the success is also due to the fact that it managed to gathered together like minded

people. The biggest sign of the success of the initiative is its cooperation with the wider community. Often times such ecovillages are isolated which prevents them to make a bigger impact.

Textual and communicative aspects of initiative

Energy consumption is never specifically mentioned, but the information on the initiatives gives signs that energy consumption is framed as a natural by-product of living an unsustainable life. The initiators also never mention which problem they try to solve, but only offer an alternative and lead by example. I believe this mentality also corresponds with the way households think about their impact on society. The initiative is more focused on changing the individual behaviour, but on the other hand offer solutions that could also work outside the eco-village. Households are framed as people living everyday lives within sustainable community, which supports their sustainable lifestyle.

The physical/technological aspects of the initiative

Various activities are being developed on the premises of the ecovillage, in particular agriculture. Vegetables and agricultural products are mostly for local consumption. There are also small food outlets for the people of the village, which are without personnel, and run directly by the people of the village. There is also a bakery and a café. The introductory courses are intended for people who want to settle in Hurdalsjøen. To become a member of the cooperative, newcomers are required to take a four-step course. This is an introduction to the principles and ways of working in the village, and ensuring that the new villagers are well prepared. Finally, political work aims to examine the meaning and values of ecological villages. Technologies introduced to households enable them cook, heat, clean, etc., differently. There are physical layouts that enable residents to share and repair products, such as workshops for repairing stuff and communal spaces, where they can spend free time.

Shared understandings related to initiative

There is definitely a shared understanding that material consumption should have less priority than spending time together, spirituality, eating together, etc. There is a shared understanding of how to live sustainable in the eco-village. The understanding is ensured via educational programme. Shared understandings are reached via communal workshops, events, and communal meals.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

Norway has vast oil and gas deposits, which brought wealth to the country. On the other hand, Norwegian electricity is almost exclusively produced from renewables – hydropower. Trends in Norwegian energy policy go in the direction of reducing GHG emissions, firstly with switching the energy source (from oil to electricity in transport), with energy efficiency measures and with RES. This orientation is represented also in national programs and campaigns, and to a visible extent in the identified SECI.

There is some attention paid in SECIs to the socio-demographic specifics of energy use. As the primary energy consumption in Norway is three times higher than the world average, quite some number of SECIs address specifically energy consumption and energy efficiency, also use of smart metering. Some of the identified SECIs actually have a rather strong community element and quite a few of them focus on cities, neighbourhoods, and local communities. On the other hand, among the identified SECIs there is only one that is focusing solely on sustainable mobility.

The majority of the identified SECIs focus on changes in individual behaviour (10 of them), while changes in technology (5 SECIs) and changes in complex interactions (3 SECIs) are less represented. Only one SECI is characterised as changes in individuals' behaviour. The majority of SECIs work at a cross-national level, the national and local level actions are rather rare (3 SECIs each).

The selected good practice example shows us an eco-village Hurdalsjøen that is run in the form of a cooperative. The whole infrastructure in the village supports the sustainable lifestyle of the villagers, who were also included in designing the initiative, are involved in it's activities on a daily basis, and are in that way co-creating decisions and development framework for the whole community (democratic processes – one person one vote). The main success of the initiative, and in that way also the main lesson learned, is that it offered people an opportunity to live a more sustainable life without compromising their quality of life – they have in self-organising principle created an alternative to living in a consumer driven environment. That can be important for policy-makers, as it also shows that in this way it is possible to create local jobs, which are at the same time minimising the ecological footprint of the community, and still have social inclusion, democratic mode of operation and respect for the environment on the top of the agenda.

REFERENCES:

<http://www.ess-europe.eu/en/bonnepratique/lecovillage-de-hurdalsjoen>

<https://www.hurdalecovillage.no/livet-i-landsbyen/>