

ENERGISE

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

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Deliverable 2.5 authors: Charlotte Jensen, Inge Røpke (AAU), Gary Goggins, Frances Fahy, Eimear Heaslip (NUIG), Marko Hajdinjak, Desislava Asenova (ARC Fund), Mathias Claeys Bouuaert, Tomislav Tkalec, Lidija Živčič, Renda Bellmalle, Kristjan Čoklč, Camille Gomes (FOCUS), Edina Vadovics, Kristóf Vadovics, Jozsef Slezak, Gergő Horváth, Szandra Szomor (GDI), Marfuga Iskandarova, Audley Genus (KU), Eoin Grealis, Annika Musch, Henrike Rau (LMU), Eva Heiskanen, Senja Laakso, Jari Kolehmainen, Eeva-Lotta Apajalathi (UH), Julia Backhaus (UM), Laure Dobigny, Marlyne Sahakian (UNIGE).

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ENERGISE partners	Logo
National University of Ireland, Galway (NUIG), University Road, Galway, Ireland	
Aalborg Universitet (AAU), Fredrik Bajers Vej 5, Aalborg 9220, Denmark	
Kingston University Higher Education Corporation (Kingston), River House High Street 53-57, Kingston Upon Thames KT1 1LQ, United Kingdom	
Universiteit Maastricht (UM), Minderbroedersberg 4-6, Maastricht 6200 MD, Netherlands	
Université de Genève (UNIGE), 24 rue du Général-Dufour, 1211 Genève 4, Switzerland	
GreenDependent Institute (GDI), Eva utca 4, Godollo 2100, Hungary	
Ludwig-Maximilians-Universitaet Muenchen (LMU Muenchen), Geschwister-Scholl-Platz 1, Muenchen 80539, Germany	
Focus Drustvo Za Sonaraven Razvoj (FOCUS), Maurerjeva Ulica 7, Ljubljana 1000, Slovenia	
Applied Research and Communications Fund (ARC Fund), Alexander Zhendov Street 5, Sofia 1113, Bulgaria	
Helsingin Yliopisto (UH), Yliopistonkatu 4, Helsingin Yliopisto 00014, Finland	

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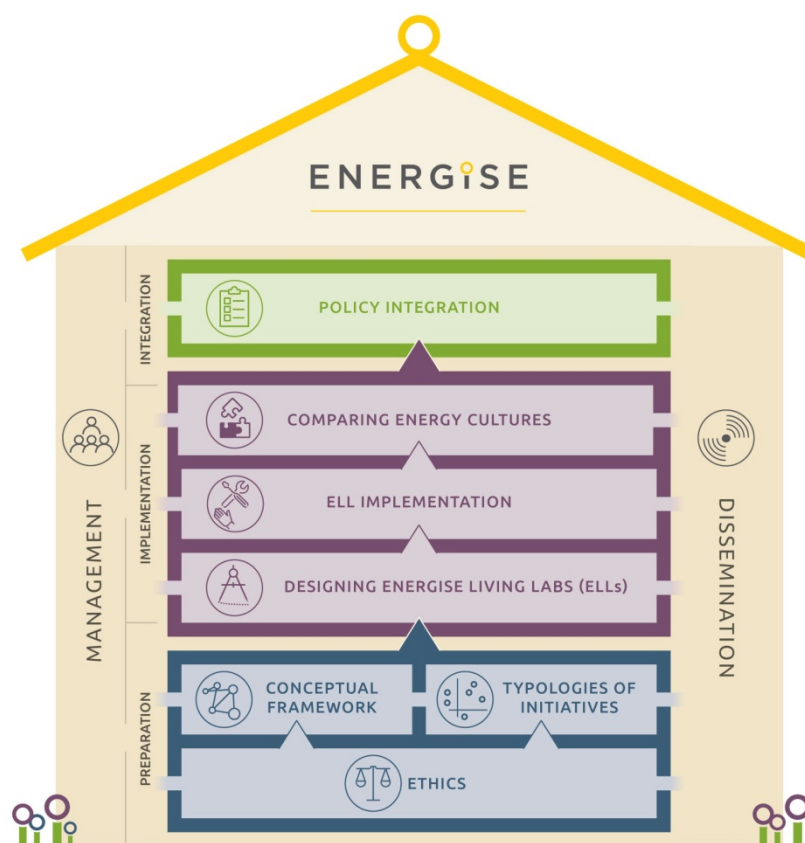
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ENERGISE PROJECT

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.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 (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:

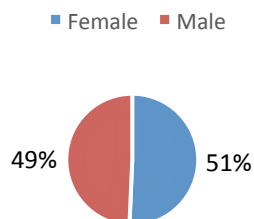
<https://www.unitjuggler.com/convert-energy-from-toe-to-MWh.html?val=893.9>

UNITED KINGDOM

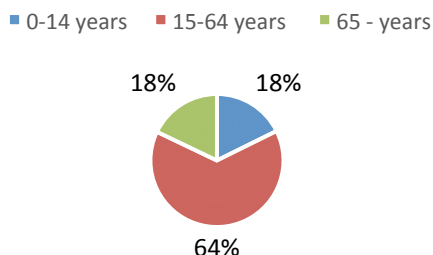
Authors: Marfuga Iskandarova, Audley Genus

DEMOGRAPHY, ENERGY CONSUMPTION AND ENERGY SUPPLY

GENDER PROFILE

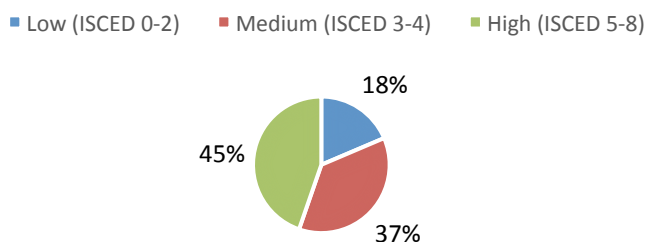


AGE PROFILE (2016)

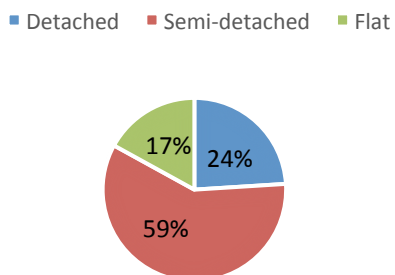


CLIMATE:
temperate;
moderated by
prevailing
southwest
winds over the
North Atlantic
Current; more
than one-half
of the days are
overcast

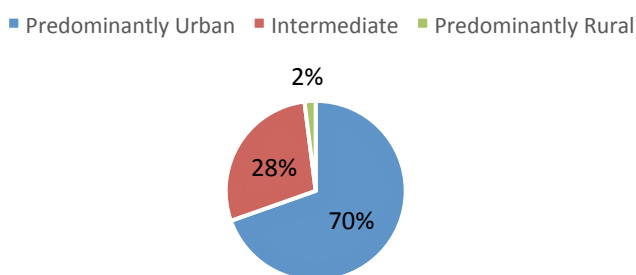
EDUCATIONAL PROFILE (25-54 Y, 2016)



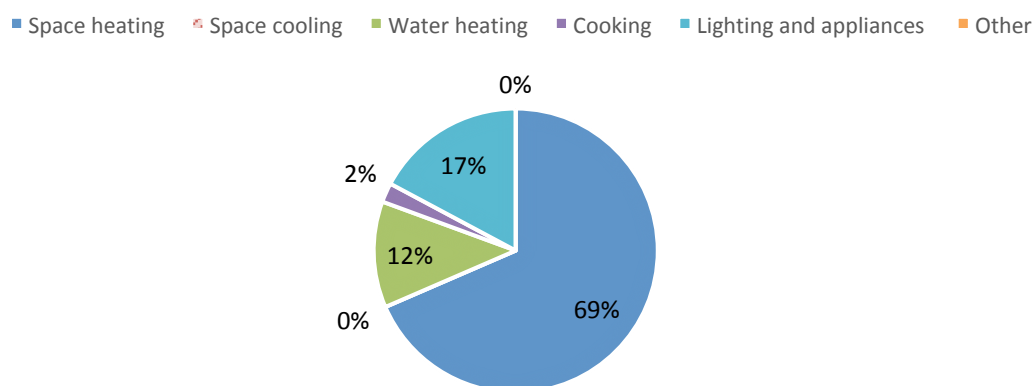
COMMON DWELLING TYPES (2015)



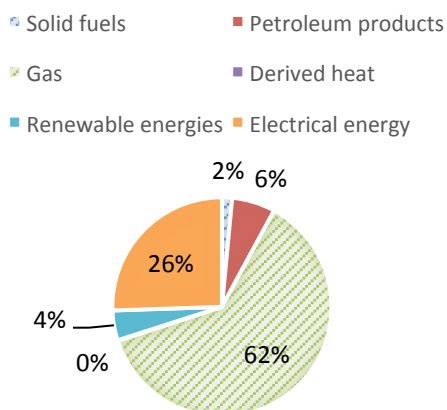
URBAN - RURAL DISTRIBUTION (OCED)



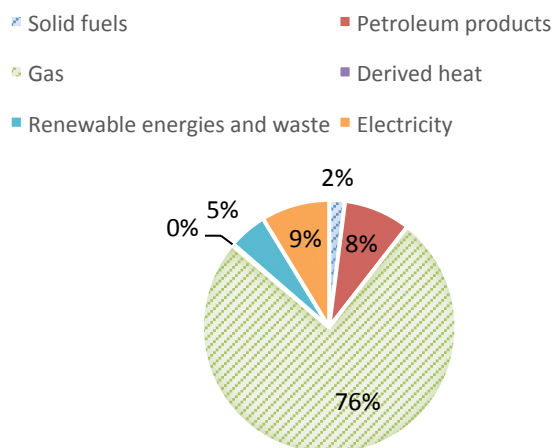
RESIDENTIAL FINAL ENERGY CONSUMPTION BY TYPE OF END-USE (2015)



SHARE OF FUELS IN THE FINAL ENERGY CONSUMP. IN THE RESIDENT. SECTOR (2015)



SHARE OF FUELS IN FINAL ENERGY CONSUMP. - RESIDENT. SPACE HEATING (2015)



FINAL ENERGY CONSUMPTION FOR HOUSEHOLDS, PR CAPITA (2015)

6.514 MWh

ENERGY SYSTEM AND ENERGY POLICY TRENDS

Energy system

The main fossil fuel sources in the UK are coal, gas and oil. The low carbon sources include nuclear and renewables such as wind, hydro, solar photovoltaics (PV) and biofuels. Fossil fuels remain the dominant source of energy supply and accounted for 81.5% in 2016, a record low level. (BEIS 2017a) The UK is a net importer of all main fuel types although it remains a net exporter of some products such as petrol and fuel oil. In 2016, 36% of energy used in the UK was imported (BEIS 2017b).

Under the EU Directive on Renewable Energy, the UK has a target to source 15% of energy demand from renewables by 2020. The UK is seen as the global market leader in offshore wind. The government has made a commitment to invest in offshore wind energy and is on track to deliver over 10GW by 2020 (DTI 2014). Solar PV, wave and tidal are not main contributors to the current energy mix in the UK. The UK is seen as a world leader and focal point for the development of wave and tidal stream technologies. With its excellent marine resource and its expertise in oil and gas exploration, the UK is in a unique position to benefit from this type of renewable energy – and to develop related wave and tidal stream services (BEIS 2013). The GB electricity system is divided into a national high-voltage transmission network and a number of regional, lower-voltage distribution networks. It is owned and maintained by regional transmission companies, while the system as a whole is operated by a single System Operator (National Grid plc). Ofgem has an important role in regulating the activities of these natural monopolies. National Grid plc also owns and operates the gas transmission system in Great Britain (four of the eight regional gas distribution networks). The electricity transmission network and the distribution network in Northern Ireland is owned and operated by Northern Ireland Electricity Networks. Northern Ireland only has five electricity providers to choose from. The gas transmission network consists of five pipelines, three are owned by Mutual Energy and two are owned by Gas Networks Ireland. Although the UK has pursued a centralised approach to energy for many decades, there is strong intention to develop decentralised energy and storage systems and replace significant volumes of large, transmission-connected fossil-fuel power stations by smaller, often distribution-network-connected, renewable generation technologies such as wind and solar. This fundamental shift will have implications for how the system is operated.

Particular socio-material aspects that influence energy consumption

Space and water heating account for 80% of final domestic energy consumption. In addition to weather factors, domestic fuel consumption is affected by household characteristics; efficiency measures and the age of the housing stock; the number and usage of appliances. An additional factor is the level of comfort required, i.e. a reasonable level of warmth, which varies over time. (BEIS 2017c) In the last 40 years, the average room temperature in the UK has risen considerably (from 12°C to 18°C in the winter months), largely due to the wide dispersion of central heating and improving insulation standards. Most households do not keep their heating on 24 hours a day; 70% of UK homes with central heating heat their homes twice per day with the peaks are around 7am and 7pm. On average, UK homes are heated for around eight hours per day in winter. (OVO energy). The UK housing stock is old relative to most European countries. As a result, many houses have poor insulation with properties resulting in additional consumption to maintain a given level of comfort. Older housing stock is gradually replaced with newer, more energy efficient homes. There have been some key changes to household characteristics, as well as energy efficiency measures, which have put downward pressure on consumption; e.g. a replacement of hot water tanks with more energy efficient boilers, installation of double glazing, cavity wall insulation. (BEIS 2017c). People in Britain prefer houses to flats. This is

explained by the assumptions about the respect for privacy and independence, and the British pride in ownership. The UK is the only EU country not to have minimum-space standards for the homes; as a result, it has the smallest new homes in Europe, significantly smaller than 100 years ago (Henley 2012). Air conditioning is not a common feature in British houses; fireplaces as well as outdoor heaters and power shower are more popular.

Current Trends in Energy Policy

The evolution of energy policy in the UK in recent years starts with the liberalisation of the energy market linked to the privatisation of state controlled energy companies (1980s-1990s), and the establishment of Ofgem (the Office of Gas and Electricity Markets). In 2006 the UK Government undertook the Energy Review concluding that nuclear must remain part of the energy portfolio, the Renewable Obligations to be fine-tuned to encourage renewables other than wind, and the use of tradable targets by energy supply companies. A catalyst for the growth of renewables was the legal requirement that the UK provide at least 15% of its energy from renewable energy sources by 2020, with the Department of Energy and Climate Change (DECC) being established in 2008 to deliver this target. The Climate Change Act 2008 is part of the UK government's plan to reduce greenhouse gas emissions (by at least 80% of 1990 levels by 2050). The UK Low Carbon Transition Plan 2009 established a roadmap for the decarbonisation of the UK. The UK Renewable Energy strategy 2009 was the action plan for delivering UK's renewable energy objectives, and the Feed in Tariff scheme was launched in 2010 as a policy mechanism to accelerate investment in renewable energy. Through the microgeneration strategy 2011 together with the Renewable Heat Incentive the Government put in place a range of financial incentives to encourage the deployment of small scale, onsite, renewable energy. This was followed by the announcement of the Green Deal Scheme, a programme for building refurbishment (was closed in 2015). The energy efficiency agenda was underpinned by the Energy Efficiency Strategy 2012 which set the direction for energy efficiency policy and identified steps to stimulate the energy efficiency market. The UK government's first ever Community Energy Strategy launched in 2014 aims to encourage communities to play a greater role in achieving energy and climate change goals, e.g. community involvement in generating electricity. Recent years have seen a growth in small scale installations of renewable energy aided by the UK FiT, but since the UK General Election in 2015, there have been substantial, negative changes to support for key renewable energy technologies (e.g. cut of FiT). The Electricity Market Reform aims to attract investment needed to upgrade the UK's electricity infrastructure and be able to meet growing demand for electricity. One of the key mechanisms of the reform is Contracts for Difference designed to support investment in new low-carbon generation, with a technology-dependent fixed price. The reform was underpinned by the Energy Act 2013 that aimed to maintain a stable electricity supply as coal-fired power stations are retired. The construction of a new generation of nuclear power stations is facilitated by the establishment of Office for Nuclear Regulation. One of the strategic choices recently announced is a use of innovation and new technologies in designing the future electricity system based on smart metering with the supporting infrastructure. The Government is committed to ensuring that smart meters are offered to every home and small business by the end of 2020, enabling smart tariffs and other benefits for consumers.



There have been a number of schemes in recent years aimed at reducing fuel poverty: The Warm Front Scheme ran until January 2013, its replacement Affordable Warmth Scheme began in early 2013, The Central Heating Fund. The Fuel poverty strategy 2015 for England aims to improve the homes of the fuel poor by 2030 achieving where possible a minimum energy efficiency rating of Band C.















Trends in national campaigns














Fuel poverty and energy efficiency are at the heart of energy campaigns in the UK. They often target energy users by providing information and advice regarding their energy bills, choosing a supplier, and particularly providing advice to low-income households. E.g. the Campaign for Warm Homes & Lower Bills (2012-2015) aimed to raise public awareness about the UK's cold home crisis and to gain support for making energy efficiency an infrastructure investment priority that would also help end fuel poverty, reduce carbon emissions and create green jobs. Other campaigns: Clean British Energy campaign (Friends of the Earth) is about getting off fossil fuels and cutting the carbon out of the power system, which will also create jobs and give the UK the chance to become a world leader in renewable energy technologies. The campaigns on behalf of British Gas, EDF Energy, E.ON, npower, ScottishPower and SSE aim to cut the number of deaths and injuries caused by carbon monoxide poisoning.

OVERVIEW OF NATIONAL SECIS

Below please find a list of UK 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.*

3e Houses (Bristol Living Lab)		Changes in Technology
City Lab Coventry		Changes in Technology
Building for the Future RENERGY LAB		Changes in Complex Interactions
Durham County Council RENERGY LAB		Changes in Complex Interactions
Kingston Smart Communities		Changes in Everyday Life Situations
Manchester is my Planet		Changes in Individuals' Behaviour
Edinburgh CRAG DEFUNCT		Changes in Individuals' Behaviour

Fownhope, Carbon Reduction Action Group ACTIVE		Changes in Individuals' Behaviour
Glasgow Carbon Rationing AG DEFUNCT		Changes in Individuals' Behaviour
Hackney & Islington Carbon Rationing AG DEFUNCT		Changes in Individuals' Behaviour
Hereford Carbon Rationing AG DEFUNCT		Changes in Individuals' Behaviour
Leeds Carbon Reduction AG DEFUNCT		Changes in Individuals' Behaviour
Oxford Carbon Rationing AG DEFUNCT		Changes in Individuals' Behaviour
Peckham Carbon Rationing AG 2007-09 DEFUNCT		Changes in Individuals' Behaviour
Sustainable Redland Carbon Rationing AG DEFUNCT		Changes in Individuals' Behaviour
York CRAG ('reduction') DEFUNCT		Changes in Individuals' Behaviour
ERIC project		Changes in Technology
Low Carbon Oxford North		Changes in Everyday Life Situations
GAP Big Energy race 2015		Changes in Individuals' Behaviour
British Gas Green Streets		Changes in Individuals' Behaviour
Halton Lune Hydro		Changes in Technology
West Solent Solar Co-operative Limited		Changes in Technology

The Othona community		Changes in Complex Interactions
Bristol Power Co-op (Lockleaze)		Changes in Technology
BedZed		Changes in Complex Interactions
NW Bicester Elmsbrook One Planet Living		Changes in Complex Interactions
One Brighton		Changes in Complex Interactions
Leamington CRAG		Changes in Individuals' Behaviour
Sevenoaks CRAG		Changes in Individuals' Behaviour
Blewbury Energy Initiative (Oxfordshire)		Changes in Technology
GoZero Chew Magna (near Bristol)		Changes in Everyday Life Situations
Carbon Neutral Biggar (Scotland)		Changes in Everyday Life Situations
Ashton Hayes Going Carbon Neutral (Cheshire)		Changes in Complex Interactions
Totnes Transition Town/TT Streets		Changes in Everyday Life Situations
Greening Wingrove		Changes in Individuals' Behaviour

‘GOOD PRACTICE’ EXAMPLE OF A UK SECI



BedZed

Description

Bed ZED is short for Beddington Zero Energy Development. There are several such eco-developments in the UK, developed by Bioregional, which was founded as a registered charity in 1994, by two environmental activists concerned about the effects of unsustainable consumption on the environment. The development featured here is in south London, in the borough of Sutton. The developer’s website describes it as the “UK’s first large-scale, mixed use sustainable community with 100 homes, office space, a college and community facilities. Completed in 2002, it has dwellings of various sizes and tenures.

Contextualization

As the developer suggests, BedZED is a ‘pioneering eco-village in south London suburbia [which is] ... an inspiration for sustainable neighbourhoods and our One Planet Living Communities across the world’. At the time it could be considered to be an unusual, almost one-of-a-kind example, of a purpose built eco-village designed from scratch by an organisation founded on environmental activism. Surveys of the residents who have moved into the development show that they like the social and community aspects of the development and appreciate the sustainability of the buildings and facilities, which include on-site car club, office space a college and allotments.

Aims and objectives

To show what a ‘truly sustainable community looks like’.

To reduce ecological footprint of contemporary living and reduce carbon emissions related to consumption of energy, water, food, and transport and in relation to waste.

Criteria for measuring performance include: electricity and heat consumption; water consumption; car ownership and miles travelled, air miles travelled, bicycle ownership; number of households who grow their own food; organic vs non-organic food consumption; recycling rates; proportion of the foregoing in and the total carbon footprint of BedZED.

The initiative can be considered a success overall, in that BedZED residents have an average ecological footprint of about 2.5 planets’ worth and the initiative seems to have been influential in stimulating thinking about the potential for building zero carbon homes. Critics would point to the high cost of completing the development and problems with the originally envisaged on site energy plant and water treatment facilities.

Methods for intervention

Eco-village was purpose-built, featuring many material, intendedly lower carbon installations and facilities which could reduce e.g. transport needs of residents relating to use of offices for work, and education.

Results/outcomes

A survey in 2007 showed that BedZED’s total energy consumption was 82.4 kWh/m²/year, compared with a UK residential total of 275.3 kWh/m²/year. BedZED (2007)related carbon

emissions were 19.9 CO₂/m²/year, compared with the UK average of 63.3 CO₂/m²/year (for based on dwellings built in 2002). Water consumption data for 2007 is given below.

Total Water Consumption

BedZED 2003 litres/ person/ day	BedZED 2007 litres/ person/ day	Local average for metered properties litres/ person/ day
91	87	143

Source: BedZED Seven Years On (2009)

The role of the households

Householders' role has been to buy, part-buy or rent BedZED properties and take advantage of the facilities provided. They contribute financially via the rent they pay or purchase price paid to own or part-own a dwelling, rather than through design activities. Yet part of what makes the initiative work on a human scale is to do with how residents interact with each other and their sense of community. Sustainability-minded people are to some extent attracted to living at BedZED by the environmental orientation underpinning the development.

Location

Hackbridge, Sutton, UK

Was/is the initiative successful?

The award winning development was designed to achieve big reductions in climate-changing greenhouse gas emissions and water use. It sought to make it easy for people living there to have a greener, lower impact lifestyle, relying less on private cars and producing less waste. It is claimed that BedZED has turned out to be a great place to live.

Textual and communicative aspects of initiative

Energy consumption is framed as a problem concerned with the whole way we live. Design of sustainable living is key to resolving over-consumption. Householders talk about BedZED in terms of the unique design of homes, the sense of community, the garden and sunspace, the green features of homes, and reduced energy bills. The initial treats energy consumption as a result of material and social organisation rather than as a result of individual actions and the way a community of people can live their everyday lives.

The physical/technological aspects of the initiative

Energy supplied via wood-fueled combined heat & power (CHP)

Homes fitted with energy efficient appliances:

- 20 watt compact fluorescent light bulb
- A-rated fridge/ freezer and washing machine

- Visible meters to make residents more aware of consumption
- Good daylight design reducing the need for electric lighting
- Passive ventilation removing the need for electric ventilation or fans
- Aerated showers, removing need for power showers
- Passive solar gain; dwellings face south with triple-storey conservatories (sun spaces)
- Super insulation; 300mm insulation jacket around each terrace
- 2 skins of double-glazing to south elevation and triple-glazing for all other elevations
- Homes fitted with water-saving appliances:
 - Dual flush 2/4 litre flush toilet
 - Reduced flow taps and shower head (basin taps: 3 litres/minute and shower 11 litres/minute)

Shared understandings related to initiative

Fundamental shared understanding of initiative as a more sustainable way to live though some residents refer to reduction in energy bills, for example, as a benefit of living at BedZED, undercutting the more inspirational and challenging narrative.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

UK energy policy today seeks to deliver solutions to the so-called energy 'trilemma' — the need for secure, affordable and clean energy supplies for the UK's economic success. It is recognised by the government that for the digital energy economy the participation of a diverse range of consumers can help enable the development of a more efficient smart energy system. In a recent consultation BEIS announced the aim of the reform as maximising the ability of consumers to play an active role in managing their energy needs. However, the emphasis is on communicating effectively the benefits of smart meters and intelligent devices to manage energy use; this will not necessarily mean greater consumer engagement, and the focus is still on reducing energy demand rather than citizens becoming 'prosumers'.

Although citizens in the UK are often portrayed as passive energy consumers for whom policy-makers attempt to deliver 'affordable' energy and competitive markets, the SECIs illustrate various ways to address/tackle issues of domestic energy consumption showing the potential for active citizens involvement. Energy efficiency, reduction of energy use and carbon emissions (carbon-neutral, low-carbon living) are declared as main objective pursued by SECIs in the UK.

It is estimated that fuel poverty affects over 4 million UK households – roughly 15% of all households. It is not surprising therefore that fuel poverty and energy efficiency are the focal points of policy discourse and energy campaigns in the UK. However, the issue of fuel poverty is still addressed directly only by a handful of the SECIs. This can be partly

explained by the fact that sustainable energy consumption initiatives are usually carried out by communities with sufficient resources for investing in those initiatives. More nuanced policy support, and particularly specific tailored measures that would incentivise households affected by fuel poverty, are needed.

A community engagement element and an inclusive approach are extremely important for the UK energy initiatives, especially where collective actions are needed (e.g. investments in renewable energy projects). Community renewable energy projects often represent active involvement of citizens/households who participate in local electricity generation initiatives. These initiatives were usually a result of supportive policies for community energy, which stimulated the rise of community renewable energy initiatives around the country. However, the recent policy changes undermined the ability of communities to develop and implement such initiatives.

The vision underlying the UK energy system and current policy priorities includes moving towards a smarter energy system. (DECC 2015a) Smart metering and use of (ICT) technology for monitoring energy consumption and emissions are among priorities for the UK SECIs. Financial incentives such as bill reductions are important for many residents; this suggests that framing sustainable behaviour as financially beneficial would make it more attractive, increasing the acceptance and adoption of sustainable consumption practices.

The good practice example discussed, the BedZED development in a suburb of London, is among initiatives that aim to change 'complex interactions' in relation to energy. It demonstrates the value of the complex approach that targets energy use along with other aspects of sustainable living (water use, transport, waste). Professional design (not citizens) combined with financial contribution from households provided a winning combination of expertise and commitments/involvement of residents. In the BedZED example energy consumption is treated as an outcome of material and social organisation; an environment that is susceptible to more sustainable practices is created, and community building is seen as a crucial element of a sustainable living initiative. The BedZED example suggests that a more holistic approach to sustainable energy could be effective if adopted by policy-makers. Supporting sustainable/eco developments, where energy is addressed and understood in the context of related sustainable practices, could make sustainable living (including energy consumption) more attractive and easier to achieve.

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