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

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# DELIVERABLE 1.2

## Framework document for ENERGISE team

## Everyday practices, cultural conventions and energy use: researching new opportunities for reducing domestic energy use in Europe

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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 adopts a Living Labs approach to directly observe existing energy cultures in a real-world setting and to test both household and community-level initiatives to reduce energy consumption. A comprehensive review and classification of household and community energy initiatives from 30 European countries provides the foundation for the development of two prototype 'ENERGISE Living Labs' designed to capture influences on individual and collective energy consumption. Data collection before, during and after the roll-out of 16 living labs to eight partner countries will be instrumental in contributing to the design and assessment of future energy consumption initiatives across Europe.

# OBJECTIVES

ENERGISE's primary objectives are to:

- Move beyond existing sustainable consumption research by developing an innovative theoretical framework that fuses social practice and energy cultures approaches,
- Assess and compare the impact of European energy consumption reduction initiatives,
- Advance the use of Living Lab approaches for researching and transforming energy cultures,
- Produce new research-led insights into the role of routines and ruptures in shifting energy use towards greater sustainability,
- Enhance multi-way engagement with actors from society, politics and industry and effectively transfer ENERGISE's outputs to further the implementation of the European Energy Union.

The ENERGISE consortium includes ten research partners (universities, research institutes, enterprises and NGOs) from Bulgaria, Denmark, Finland, Germany, Hungary, Ireland, Slovenia, Switzerland, the Netherlands and the United Kingdom.

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# EXECUTIVE SUMMARY

Energy use in the EU continues to be stubbornly high, a fact that poses major challenges for energy research and policy. This document outlines the conceptual framework for the social scientific investigation of everyday practices and related patterns of household energy use in the context of the ENERGISE project. It notes the prevalence and persistence of traditional market and technology based efforts to reduce household energy use, despite clear evidence of their limited long-term impacts due to rebound effects. Recognising that initial efficiency savings are often eaten up by changes in routines and habits such as increases in the use/number of domestic appliances, ENERGISE adopts an alternative approach to household energy use that revolves around every practices.

Based on an in-depth review of practice-theoretical contributions to social-scientific energy research, energy use is treated as a material expression of people's performance of everyday practices and associated cultural conventions. It is also acknowledged that while practices have directly observable aspects that lend themselves to conventional social-scientific inquiry, their tacit or hidden elements can be equally (if not more) important. The challenging task is to systematically uncover, and incorporate into analysis these hidden parts of practices. In addition, socio-cultural factors that shape collective energy demand must be accounted for. To achieve this aim, ENERGISE proposes to use the concept of practice cultures as a bridge between various practice-theoretical and culturalist perspectives.

ENERGISE is also firmly committed to exploring contrasting perspectives on behaviour change, with a view to presenting the broadest possible range of options for reducing household energy use. Moving beyond conventional approaches such as the promotion of energy-saving technology or efforts to increase energy efficiency by redirecting individuals' behaviour and consumer choices, ENERGISE explicitly recognises the hitherto untapped potential of sufficiency thinking and practice. To this end, it explores opportunities for recrafting and substituting energy-intensive practices in ways that work with people's needs and everyday routines.

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## 1. INTRODUCTION

Social-scientific energy research is central to understanding variations in energy use across households, social groups and societies as well as their links with energy governance and policy. This principle starkly contrasts with the current situation whereby '[s]ocial science related disciplines, methods, concepts, and topics remain underutilized, and perhaps underappreciated, in contemporary energy studies research' (Sovacool 2014: 1, see also Lutzenhiser 1994, Lutzenhiser and Shove 1999, Heiskanen et al. 2010, Fox et al. 2017). ENERGISE seeks to strengthen the role of social science energy research through a theoretically grounded and empirically rigorous comparative study of domestic energy use and its transformation in eight European countries.

This document outlines the conceptual framework of the ENERGISE project. Drawing on a careful review of existing social-scientific and interdisciplinary work on the dynamics of energy use in households and its connections with everyday practices, it has three main aims, namely to:

1) provide a detailed account of **how everyday practices and their cultural shaping influence household energy use**,

2) **identify and describe different dynamics and trajectories of change** that affect everyday practices and related cultural conventions and that could be incorporated into practical initiatives aimed at reducing domestic energy use, and

3) **outline opportunities for practice-oriented and culturally sensitive forms of social inquiry** that deploy transdisciplinary techniques such as Living Laboratories to translate knowledge into action, to encourage the replacement of energy-intensive everyday practices with less resource-intensive ones.

## 2. RECONCEPTUALISING ENERGY USE AS A MATERIAL MANIFESTATION OF EVERYDAY PRACTICES AND CULTURAL CONVENTIONS

A multitude of behavioural and cultural explanations for the scale and quality of domestic energy use have emerged over the past decades (see Sovacool 2014 for a recent systematic analysis of social-scientific energy research). Thematically, these range from work that focuses on personal, social, cultural, organisational and political factors that influence people's propensity to engage in more or less energy-intensive activities (e.g. Crosbie and Baker 2010, Shove and Walker 2010, Druckman and Jackson 2008, Hargreaves 2011, Gram-Hanssen 2013, Lavelle et al. 2015, Sovacool et al. 2015, Belaïd 2016, Jensen, 2016,  Genus and Jensen 2017) to detailed socio-material studies of how domestic energy demand reacts

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to the introduction of new technologies, energy sources, or appliances, including those that accompany thermal retrofits (Bartusch et al. 2012, Moran et al. 2016, Rau et al. 2017). This is complemented by a rapidly expanding body of work on energy policy and governance and related questions of energy (in)justice (Healy and Barry 2017).

The diversity of social-scientific energy research is also reflected in the broad range of empirical inquiries into attitudes and behaviour concerning energy use (Brandon and Lewis 1999, de Almeida et al. 2011, Vassileva et al. 2012,  Zhou and Yang 2016); variations in domestic energy use based on class or socio-economic status (Sovacool 2011, Galvin and Sunikka-Blank 2014, Chatterton et al. 2016); concrete manifestations of energy injustice and related issues concerning the unequal distribution of both financial and non-material benefits of change initiatives intended to reduce domestic energy use (Sovacool 2013, Vadovics and Boza-Kiss 2013, Heffron et al. 2015, Lavelle et al. 2015, Healy and Barry 2017). Moreover, social-scientific and interdisciplinary energy research carried out in different European countries have revealed variations in energy demand between households due to personal factors such as experiences of thermal (dis)comfort und expectations concerning the level of lighting needed for different activities (Gram-Hanssen 2010, Huebner et al. 2013, Rau et al. 2017).

Other studies explore the societal and environmental consequences of energy policy and governance efforts aimed at initiating sustainability transitions in the energy system in different locales. Examples include efforts towards fossil fuel divestment in the US (Healy and Debski 2016), the 'energy turn' in Germany (Stieß and Dunkelberg 2013, Großmann et al. 2014, Wolff and Schubert 2014, Wolff et al. 2017), or domestic energy retrofitting programmes in the UK, Germany, New Zealand and Ireland (Kuckshinrichs et al. 2010, Telfar-Barnard et al. 2011, Collins and Curtis 2016, Kerr et al. 2017, Rau et al. 2017). Links between personal time budgets and domestic energy use have also attracted attention (Schipper et al. 1989; Jalas 2002, 2005, 2009; Widén et al. 2012; Rau 2015; Torriti 2017).

Concerning methodology, a strong focus on quantifying domestic energy demand and its variations has been complemented by socio-material inquiries into the quality of energy use in the home, although the latter remains a niche within the field of energy research more generally, and social-scientific energy studies in particular. These observations mirror Sovacool's (2014: 2) call for 'for more human-centred research methods, interdisciplinary collaborations, and comparative analysis' in social science energy research'. Overall, there is a rich body of social-scientific research on 'the human side' of energy provision and use that reflects diverse theoretical, conceptual and empirical foci. While this diversity presents many advantages, there are also considerable drawbacks that include a scarcity of more or less coherent schools of thought. This said, the emergence of a rapidly growing body of practice-theoretical work on energy use appears to offer an interesting common thread in social-scientific energy research.

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## 2.1 KEY ASPECTS OF DOMESTIC ENERGY USE

A review of key publications in the area of social-scientific and interdisciplinary energy research illustrates the wide variety of influences on domestic energy use while also demonstrating the need for a better understanding of the dynamics of everyday practices (Genus and Jensen 2017, Wilting et al. 1999, Lutzenhiser 2008, Maréchal, 2010, Davies et al. 2014, Ingle et al. 2014, Janda 2014, Allouhi et al. 2015, Shove et al. 2014). In this context, a multitude of influences on the adoption of particular practices has been identified in the literature, which will be summarised in this section. These range from **personal factors to household dynamics and their connections with wider social, political and material conditions** (e.g. media coverage of energy issues, energy use patterns in workplaces, technological innovation concerning energy generation, economic incentives for micro-generation of energy at household level). For example, a significant number of publications have identified **personal views, values and convictions** concerning resource use more generally, and energy use in particular as a potential source of variation in individuals' engagement in energy-intensive practices. However, it remains unclear how much influence cognitive attributes such as pro-environmental views exert over people's actions, or whether there is any consistency in behaviour that can be attributed to shared views (Martinsson and Lundquist 2010, Kammerlander et al. 2014, Dijk et al. 2017). Yet others emphasise the existence of a so-called 'value-action-gap' (Kollmus and Agyeman 2002, Davies et al. 2005, de Carvalho et al. 2010) or go even further to critique and question the attitude-behaviour-choice (ABC) logic that underpins many of these debates (Shove 2010). Evidence of the strong influence of non-cognitive characteristics such as affect or emotions (Sahakian 2015, Davidson 2017) or bodily memory (Wallenborn and Wilhite 2014) on people's (lack of) engagement in practices further strengthens the case for moving beyond exclusively cognitive explanations of human action. Additionally, and perhaps more pertinent for ENERGISE, individuals' engagement in taken-for-granted or tacit **routines and habits** (and related reductions in cognitive effort needed to make decisions in complex situations) has received considerable attention (Maréchal, 2010, Huebner et al. 2013, Moran et al. 2016). In these accounts, energy use is frequently treated as an enabler of everyday practices.

**Demographic factors** also play a role (re)shaping domestic energy use, including in areas such as space and water heating. For example, recent cross-sectional research on environmental views and habits has revealed significant intergenerational differences concerning perceptions of luxury and necessity as well as attitudes and actions concerning the frugal use of resources (including energy) and associated efforts to avoid wasteful behaviour (e.g. Lavelle and Fahy 2012). **Expectations and prior experiences** also matter greatly (Backhaus et al. 2015, Huebner et al. 2013, Kingma and van Marken Lichtenbelt 2015). For example, ample evidence exists of variations in personal thermal comfort levels depending on people's gender, age, or cultural background, even between countries with similar climatic conditions (Kammerlander et al. 2014). These variations are partly attributable to the performance of practices that affect thermal comfort such as physically demanding chores (Gram-Hanssen 2010, Hitchings 2013). Moreover, it seems important to also pay

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adequate attention to people's physical attributes, thereby following suggestions by some theorists to treat practical knowledge as inherently embodied (Schatzki 2001, Wallenborn and Wilhite 2014). For example, Schatzki (2001) stresses the role of 'a battery of bodily abilities that results from, and also makes possible, participation in practices' (p. 9). He then concludes that 'social orders rest upon practices that are […] rooted directly in the human body' (p.9). Similarly, Wallenborn and Wilhite (2014) criticise mainstream theories of consumption for collapsing body into mind. For them this overemphasis on cognition, mental states, meaning and rational choice implies that 'the demand for goods is both disembodied and decontextualized from social and material worlds' (p.56).

**Household characteristics** that shape how (much) energy is used by its members include **household size** (DSFA, 2009, ISOE 2016), **composition** (Druckman & Jackson, 2008) and **income** (Schaffrin & Reibling 2015, Sahakian 2017, Wolff et al. 2017). Importantly, **relationships and interactions between household members** significantly influence both quality and quantity of household energy use. Cooking a shared meal for all family members in a household is likely to differ in terms of energy use compared to each individual household member cooking/heating up their own meal. **Temporal and spatial arrangements** also matter greatly both within the domestic sphere and beyond. For example, a close link exists between time use patterns within households and their resource use, including energy (Jalas 2005, Rau 2015, Torriti 2017). Similarly, the pace of society can have significant effects on how much energy is used both within households and outside (Jalas 2002, 2005).

Household-specific patterns of energy use both shape and reflect those in other social settings e.g. communities, clubs and associations, workplaces or local and regional institutions (Heiskanen et al. 2010, 2013). **Shared norms, values and expectations** concerning energy use tend to be (re)produced and enforced within these settings, for instance in relation to the orientation and priority of infrastructural and material changes such as energy retrofitting programmes (Genus and Theobald 2014, 2015). Here, the role of **policy, regulations, laws and subsidisation patterns** cannot be overestimated. For example, the German government's commitment in 2011 to replacing fossil fuel and nuclear sources with renewable ones (*Energiewende*) has had a significant impact on prevailing norms and expectations regarding energy supply, pricing and use across diverse social groups and settings. These are complemented by **developments at the global level** that influence household energy use. Strong fluctuations in the price of key energy resources such as oil resulting from international negotiations (e.g. OPEC), or conflicts and wars spring to mind.

## 2.2 PRACTICE-THEORETICAL CONTRIBUTIONS TO SOCIAL-SCIENTIFIC ENERGY RESEARCH

A recent trend in social-scientific energy research has been the development and diffusion of approaches that focus explicitly on everyday practices as a central cause of (variations in) domestic energy demand (Lutzenhiser and Shove 1999, Gram-Hanssen 2011, Strengers and Maller 2012, Burchell et al. 2014, Shove et al. 2014, Wallenborn and Wilhite 2014, Røpke 2015). ENERGISE draws on and expands this rich body of work. It views energy use as one of the main outcomes of people's more or less regular engagement in **everyday practices**, including heating their homes, cooking, or moving between their home and their workplace. These practices consist of different elements, fusing meaning, skills and competences, and material conditions (Backhaus et al. 2015) and incorporating wider societal conditions (Shove et al. 2012, 2015; Sahakian and Wilhite 2014; Genus and Jensen 2017). The latter includes **diverse cultural norms and conventions** that regulate more or less rigidly people's everyday conduct and related ways of consuming natural resources, including energy.

ENERGISE adopts a perspective on energy use that is both practice-oriented and culturally sensitive and that reflects two key insights shared by the research team.

1. It **views energy use as collectively shared and culturally mediated**, thereby departing from individualistic definitions of energy choices and behaviour that have unduly limited social-scientific energy research in the past.

2. It **promotes cutting-edge social-scientific energy research** that covers both social and material dimensions of energy use in households and communities and their impacts on society and the environment.

**Practices usually consist of a visible part, like the tip of the iceberg that floats above water, and a much bigger and largely invisible part that remains below surface.** The former usually features directly observable behaviour as well as material objects and resources that are crucial to the performance of a practice. The latter, in contrast, combines elements that frequently resist direct observation and assessment. These include taken-for-granted cultural norms and conventions concerning the desirability of certain practices, prevailing political and economic conditions and institutions, and the availability, presence and prevalence of particular technologies and infrastructures. Importantly, people's engagement in a particular practice both shapes and reflects the social environment that they are embedded in, ranging from family relations and household structures to wider societal conditions.

*Investigating the iceberg: visible and hidden elements of practice*

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According to Spurling et al. (2013), individual behaviour constitutes the visible performance of a social practice that rests upon the effective use of 'objects, tools and infrastructures, of knowledge and skills and of cultural conventions, expectations, and socially shared tastes and meanings' (p. 9). In other words, observable behaviour is the tip of the 'practice iceberg', with the social underpinning of behaviour (practice as entity) forming the (often much larger) invisible part. Attempts to shift behaviour towards



sustainability are thus likely to have only limited effects. '[…] social practices are a better target for sustainability policy than 'behaviour', 'choice' or technical innovation alone. Understanding the dynamics of practices offers us a window into transitions towards sustainability' (p.4).
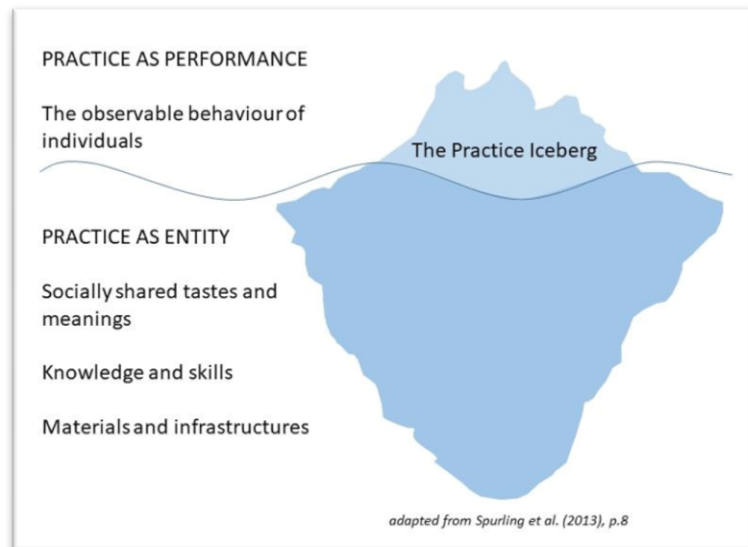
Methodologically, the empirical investigation of both the visible and hidden parts of practices presents both opportunities and challenges, especially in relation to the development of new tools for social inquiry. **Visible parts of practices lend themselves to more or less direct observation in social-scientific sustainability research and related change initiatives.** For example, a large body of literature covers directly observable elements of spatial mobility practices, including people's modal choice or their route selection to and from work (Watson 2012, Dijk and Parkhurst 2014, Cass and Faulconbridge 2016). In addition, social scientists frequently use well established parameters and indicators that have been developed by natural scientists and engineers to quantify daily mobility (e.g. number of kilometres travelled per annum, number of cars per 1,000 inhabitants). **However, the more challenging task is to systematically uncover, and incorporate into analysis the hidden parts of practices** such as the meaning people attach to using particular transport modes, or the skills and competences necessary for people to engage in multi-modal commuting practices. To do so effectively requires innovative and integrated forms of empirical inquiry (cf. Fahy and Rau 2013). In addition, more attention needs to be paid to the material elements of practices that may or may not be open to direct investigation.

A commitment to a culturally sensitive approach to understanding everyday practices and associated patterns energy use draws attention to prevailing **energy cultures, that is, socio-cultural factors that shape collective energy demand and create variations in how energy is generated, distributed, viewed, and used both within and between countries** (Wilhite et al. 2000; Stephenson et al. 2010, 2015; Rau et al. 2017). According to Stephenson et al. (2010), the concept of energy culture merges systems thinking and behavioural theories

in fruitful ways, thereby moving beyond more narrow behavioural perspectives, or overly broad systemic models. Energy cultures can also vary substantially within countries or across geopolitical boundaries, which draws attention to the need for new units of analysis 'beyond the nation-state' as part of new and innovative cross-national and cross-cultural comparisons in energy research. Regrettably, work on energy cultures has hitherto remained scarce in energy research, with some notable exceptions such as the work by Lutzenhiser (1993), Wilhite et al. (2000), Wilk (2002) and Stephenson et al. (2010).

Attributing observable variations in energy use resulting from people's engagement in practices both at home and out of home to cultural differences presents opportunities but also considerable conceptual challenges. First, it is necessary to try to find a working definition of what constitutes an 'energy culture'. According to Stephenson et al. (2010) and Rau et al. (2017), energy cultures comprise three key elements – 1) prevailing material conditions, 2) both dominant and marginal attitudes, perceptions and social norms and 3) more or less routinised practices that use energy. Importantly, energy cultures both evolve from and shape energy use at different levels of social organisation, including households as an important meso-level unit (Biesiot and Noorman 1999, Stephenson et al. 2010, Reid et al. 2010). As Biesiot and Noorman (1999) observe, households are

> […] the smallest social units, consuming a complex and changing mix of goods and services. [*This makes up an*] integral pattern of natural resources flowing in and out of households […] called *household metabolism*. […] Measuring household consumption patterns (expressed in energy terms) as a means towards understanding how to direct them towards environmentally sustainable goals requires insights into the mechanics of household metabolism (p. 369-70, emphasis in original).

Moreover, organisations and institutions, local communities, administrative units such as municipalities, or specific geographical regions might develop their own distinct energy cultures, with considerable consequences for energy use in households.

**Table 1: Key elements of energy cultures**

| Element | Examples |
|---|---|
| **Material conditions** | Technologies, energy infrastructure, house characteristics such as insulation, energy sources and heating devices |
| **Attitudes, perceptions and social norms** | Aspirations, expected comfort levels, environmental concern, respect for tradition, social acceptability of wasteful/resource-intensive activities |
| **Energy use** | Choosing which rooms are to be heated, heat settings, hours of heating, ventilation practices, cooking, washing, use of appliances, use and maintenance of technologies |

Source: Modified version of Energy Cultures Framework (ECF) by Stephenson et al. (2010)

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By incorporating previous social-scientific work on energy cultures, ENERGISE explicitly recognises the existence of **distinctive, culture-specific combinations of practices adopted and shared by particular units of social organisation** (e.g. households, communities, organisations, nation-states). This implies a view of **cultural change as a key ingredient of successful energy sustainability transitions**, including reductions in household energy use (O'Rourke and Lollo 2015) and the prevention of subsequent rebound and 'backfire' effects (Hertwich 2005, Druckman et al. 2011, Chitnis et al. 2014). Combining an emphasis on energy cultures and everyday practices with a focus on local, regional, national and EU policy efforts, ENERGISE aims to identify socio-cultural and systemic factors that influence efforts towards reducing energy use in households. The project moves beyond state-of-the-art energy scholarship by theoretically **framing changes in energy use as a transformation of shared everyday practices and related cultural conventions** (as opposed to shifts in individuals' behaviour motivated by attitudinal changes).

How can an explicit conceptual and methodological focus on domestic practices and their energy impacts be fruitfully extended to explicitly incorporate aspects of cultural difference and intercultural (mis)understanding? Recent practice-theoretical work provides some clues in relation to the importance of divergent **practice cultures** (without necessarily referring explicitly to the concept of 'culture'). For example, Kemmis *et al.* (2014) observe that

> [h]ow we act is also shaped in large part by the *practice landscape* of a neighbourhood or a school (for example) that enables and constrains how life can be conducted there, and the *practice traditions* of a particular society or profession (for example) that similarly enable and constrain the ways people conduct themselves (p. 5, emphasis in original).

Similarly, Ann Swidler's (2001) critical appraisal of different conceptions of culture as 'practice' demonstrates the merits of viewing place- or setting-specific bundles of practices as publicly observable and empirically traceable socio-material manifestations of culture. Interestingly, the term **'practice cultures'** has occasionally been used to describe firmly established and potentially hard-to-change sets of practices in specific institutional or professional contexts (e.g. Field's work in 2007 on practice cultures in relation to early criminal justice interventions in the UK). However, it has not yet received any sustained attention in social-scientific sustainability research more generally, and studies of domestic energy use in particular. ENERGISE proposes to use the concept of **practice cultures** as a bridge between practice-theoretical and culturalist perspectives.[1] It is argued that doing so draws explicit attention to the existence of **culture-specific sets of practices that result in specific patterns of energy use** that merit further social-scientific investigation both within and between countries.

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[1] In this document we treat explicitly practice-theoretical approaches and culturalist perspectives as two different, yet closely intertwined strands of social theory. By making this distinction, we deviate somewhat from perspectives that treat practice theory as inherently culturalist (e.g. Swidler 2001, Reckwitz 2002). This serves the purpose of recognising that some culturalist perspectives incorporate notions of practice that clash with those endorsed by prominent practice theorists.

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Naturally, a commitment to explicitly combining practice-theoretical and culturalist approaches to energy use as part of ENERGISE throws up some interesting ontological and epistemological challenges. For example, social-scientific inquiries into energy cultures appear to be underpinned by divergent worldviews (ontology), most notably in relation to the scope and quality of individuals' agency and its relevance to the (re)production of everyday life vis-à-vis broader structural influences. This may result in some irresolvable ontological tensions that closely resemble those discussed in relation to Giddens' and Bourdieu's efforts to overcome rigid structure-agency-dualisms (Giddens 1984, Bourdieu 1990, Baber 1991). For example, debates continue in social-scientific sustainability research in relation to the question how big a role individual practitioners play in the formation, reproduction or dissolution of practices (Shove et al. 2012, Greene and Rau 2016).

Concerning the question how to study energy use empirically (epistemology), **treating practices as main unit of analysis** clearly shifts attention away from what individuals want, think or do. While this may be a step in the right direction (i.e. away from methodological individualism), it also presents new challenges concerning the design of empirical research and change initiatives. For example, it may be necessary to define the boundaries of a practice, or to distinguish a practice from other neighbouring practices when conducting fieldwork in households. Take for example intermodal commuting whereby people switch between modes of transport as part of their journey to/from work. Does this constitute a single practice (multimodal commuting) or a combination of different mobility practices (cycling + public transport use + walking)? Moreover, it may be necessary to develop novel approaches to social research that are capable of capturing practices in their entirety, including hidden aspects or material elements that influence practices from afar and that resist immediate observation. These and related issues are dealt with in more detail below.

## 3. CHANGING PRACTICE CULTURES? UNDERSTANDING AND TRANSFORMING ENERGY USE

An explicit commitment to conceptualising the linkages between everyday practices and prevailing cultural conventions that guide energy use raises important questions concerning the dynamics of change, especially transformations affecting the bottom part of the iceberg (practice as entity). In addition, the intergenerational transmission of culture and the relative durability of many cultural conventions regulating everyday life (including the use of natural resources) arising from this deserve greater attention than before. Here, existing studies and initiatives that focus on framing and initiating practice-related changes provide important starting points for both the conceptual framework and empirical part of the ENERGISE project.

*Researching energy use in everyday life and its transformation: existing evidence and remaining gaps*

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Efforts in the realms of research and policy to better understand and potentially transform everyday practices and related resource consumption patterns are gathering momentum, with a range of research projects in Europe attending to this issue. For example, research carried out at the UK-based DEMAND centre over the last number of years explored the dynamics of energy demand as a result of the performance of practices and their potential transformation (e.g. Shove et al. 2014, Kuijer and Watson 2017)[2] Similarly, a recent transdisciplinary project led by the Institute of Social-ecological Research (ISOE) in Frankfurt focused on the development and introduction of an energy labelling system for households that moves beyond a sole focus on directly measurable energy use to take into account household composition and practices (ISOE 2016). User Practices, Technologies and Residential Energy Consumption (UserTEC), a five-year multidisciplinary research project supported by Innovation Fund Denmark, examines the potential for energy savings in households through changes in residents' practices (Gram-Hanssen et al. 2016)[3]. The European InContext project (FP7, 2010-2013) employed action research to study how the concept of sustainable development can be brought to life in enabling conditions for an ecologically sound, economically successful and culturally diverse future that taps into individual capabilities and local 'transition arenas'.[4] Similarly, during the European Changing Behaviour project[5] (FP7, 2009-2011) researchers and practitioners collaborated to develop, test and refine context-specific and culturally sensitive tools for improving interaction between all actors involved in change initiatives.

Considerable gaps nevertheless remain, especially in core areas of energy research outside the social sciences where the role of people and their practices continues to receive little or no attention. As Sovacool (2011) argues, '[e]nergy studies, energy policymaking, and energy reporting seem similarly ensnared in sharing the perception that the most important elements of the energy system are fuels and technologies' (p. 1659). This gap is also highlighted and discussed in the recent SHAPE ENERGY report on the subject of energy and the 'active consumer' (Fox et al. 2017). To address this major gap, **ENERGISE considers transformations of household energy use to be fundamentally 'socio-technical' in nature**. In other words, the success of low-carbon technologies and energy efficiency measures hinges on them 'making sense', that is, speaking to people's established practices and fitting their everyday lives and personal projects, including their own aspirations and financial means. By viewing practices as more or less complex configurations of both social and material elements, ENERGISE moves beyond state-of-the-art research that focuses either on 'technical fixes' or 'social fixes' and that fails to adequately connect these interlinked aspects of energy demand and use.

A strong focus on practices and their embeddedness in the wider 'cultural landscape' also implies reframing related concepts of sustainability and change. Building on ground-breaking

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practice-theoretical work by Spurling et al. (2013), ENERGISE explicitly moves away from common framings that dominate current research and policy efforts and that focus more or less exclusively on new technology and behavioural change at the individual level as primary 'solutions' to sustainability challenges (cf. Shove 2010). Coming from a practice theoretical perspective instead, **ENERGISE views change as more or less visible shifts in the structure and composition of (individual) practices and interactions between these practices.** These, in turn, may or may not be attributable to significant **ruptures** in everyday life, including major life events or societal transformations involving changes in everyday practices and their energy requirements. ENERGISE explicitly incorporates steps to explore opportunities for reducing energy use through such ruptures, as well as drawbacks arising from (deliberate or accidental) interruptions to long-established energy-intensive practices.

**Table 2: Six ways in which the sustainability challenge is framed**

| Problem Framing | Target of Intervention |
|---|---|
| *Common framings in current policy interventions* | |
| **1. Innovating technology** | Reduce the resource intensity of existing patterns of consumption through technical innovation |
| **2. Shifting Consumer Choices** | Encourage consumers to choose more sustainable options |
| **3. Changing Behaviour** | More broadly, encourage individuals to adopt more sustainable behaviours and discourage them from less sustainable behaviours. |
| *Framings drawing on a practice perspective* | |
| **4. Re-crafting Practices** | Reduce the resource intensity of existing practices through changing the components, or elements, which make up those practices. (Practice elements are introduced below.) |
| **5. Substituting Practices** | Replace less sustainable practices with more sustainable alternatives. How can new or alternative practices fulfil similar purposes? |
| **6. Changing how Practices Interlock** | Social practices interlock with each other - for example: mobility, shopping and eating. How can we harness the complex interactions between practices, so that change ripples through interconnected practices? |

Source: Spurling et al. (2013)

Understanding change also implies the development of ideas about what **stability** is, how it manifests itself, and what factors appear to stabilise practices over time (Pantzar and Shove 2010, Gram-Hanssen 2011, McMeekin and Southerton 2012, Shove et al. 2012). First, it seems important to treat stability and change as interconnected phenomena rather than mutually exclusive opposites. The resulting stability-change-continuum implies that some practices may seem reasonably stable when in fact they are undergoing a very slow transformation. In other words, a change in practices may occur either gradually or suddenly.

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The latter may be observed whenever one or more elements of a practice disappear rather rapidly and perhaps unexpectedly (e.g. when a law is brought in to stop the sale of cancer-inducing food additives or environmentally harmful pesticides). Highly visible sources of rupture also contrast with (largely) invisible interferences that can make a practice disappear (e.g. the gradual loss of knowledge and skills required to engage in a traditional practice such as thatching, wooden boat building or basket making). Finally, some practices may seem to have disappeared when in fact they have become dormant instead. Here, it is possible for these practices to re-appear whenever their elements become favourably reconstituted.

Complementing the focus on influences disrupting or destroying practices, we also need to recognise the multitude of factors that promote stability. For example, long-standing institutions or well-established cultural conventions may stabilise a practice (more or less), making stability and change place-specific (Genus and Jensen, 2017). Concerning these local specificities that may or may not affect how (often) practices change, we draw inspiration from an existing framework for understanding the local configuration of practices developed by Kemmis et al. (2014). This framework considers the local (site-based) configuration of practices and how this configuration is enacted, with practices being seen as interrelated and held together in so-called practice ecologies. These configurations or ecologies are in turn contingent upon 'practice architectures' that hold different practices in place.

The **quality and purpose of using energy** also deserves greater attention than has hitherto been the case. Recent efforts across Europe to make residential dwellings more energy-efficient through energy retrofitting measures (e.g. installation of new windows, improved insulation) have repeatedly shown great variability in household energy use (Hand and Shove 2007, Gill et al. 2010, Gram-Hanssen 2010, Stieß and Dunkelberg 2013, Rau et al. 2017), a fact that deserves much greater attention from social scientists than before. For example, Gill et al. (2010) discovered a variance of 51%, 37% and 11% in the use of heat, electricity and water in 11 low energy dwellings in the UK that can be attributed to variations in energy-related practices. A systematic comparison of five identical residential buildings in Denmark showed significant variations in how (much) energy is consumed by householders for the purpose of heating their home (Gram-Hanssen, 2010). Similarly, an analysis of pre- and post-retrofit energy use data from 20 Irish houses earmarked for retrofitting revealed significant variations in household energy use prior to retrofitting as well as differences in how householders responded to energy-related modifications to their homes (Rau et al. 2017).

Gaps also remain in the investigation of **the role of different units of social organisation** such as households, neighbourhoods and communities, businesses, professional and religious organisations, trade unions, clubs and associations in the promotion of societal change, particularly in relation to energy-related conventions and practices (Janda 2014, Jäntschi 2016). For example, Reid et al. (2010) highlight the need for a shift in focus beyond the individual. Drawing on work by Haanpaa (2005) and Bibow et al. (2005), these authors endorse a view of society as a dynamic process that connects pre-existing social structure

and current human actors, thereby reproducing and transforming social structure (Reid et al. 2010: 315).

ENERGISE responds directly to these gaps by **recognising households as a key unit of social organisation**, thereby challenging concepts of households as more or less self-contained enclaves of individualised private life. Interestingly, households frequently display their own practice cultures that respond to individual members' needs and that arise from their social interactions and joint practices both within the household and outside. At the same time, household energy use inevitably reflects social and material conditions outside the home (Stephenson et al. 2010, 2015). These include prevailing norms in society concerning energy use (e.g. whether or not it is socially acceptable to engage in certain kinds of wasteful or resource-intensive practices), existing infrastructure (e.g. accessibility of renewable energy supply) and policy (e.g. varying tax rates for different products, including electricity, gas, wood and coal). Households of different sizes and featuring different practice cultures will form the main unit of analysis in ENERGISE, contrasting with dominant models of individual- and national-level energy research.

Another issue that has unduly curbed the validity of a significant number of social-scientific and interdisciplinary energy studies has been their (implicit or explicit) insistence on conceptualising society as an aggregation of individuals whose largely rational, goal-oriented or largely economically motivated behaviour (more or less automatically) 'produces society' (see Shove 2010 for an excellent critique of this type of approach). As a result, pertinent sociological questions have remained unanswered, including **how energy use varies across different units of social organisation, what distinct types of 'cultures of energy use' and related everyday practices can be found in a given society and how these interact (or not), especially in situations where there are obvious tensions between them**. These apparent omissions have informed our decision to focus explicitly on influences on domestic energy use that reflect the dynamics of everyday life across different units of social organisation (i.e. individual, household, community/organisation, society). Our approach thus departs from many previous studies, for example those that strictly separate social and cultural factors from economic and technological ones.

## 4. DISTINGUISHING DIRECT AND INDIRECT ENERGY USE

Domestic energy use can take very different forms. Importantly, the household as a socio-spatial unit tends to be the location of actioned practices that use energy generated outside the domestic realm, for example when food is purchased in a supermarket but prepared and consumed at home. In this context, a distinction is often made in the literature between **direct and indirect household energy use** (Biesiot and Noorman 1999, Reinders et al. 2003, Abrahamse and Steg 2009, Freire-González 2017). Direct household energy use describes practices that require a domestic energy supply (e.g. lighting, use of appliances/machinery, water and space heating), usually amounting to less than 50% of total domestic energy use

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(Biesiot and Noorman 1999, Chatterton et al. 2016). For example, Druckman and Jackson (2008) estimate energy usage and carbon emissions from domestic gas and electricity and through private car use to contribute 42% of all household emissions (30% from gas, electricity or solid fuels, 12% from private car use). Indirect household energy use refers to the consumption of goods and services that have been produced elsewhere and that have thus used an energy supply located outside the home (e.g. embedded energy in food that is bought in the supermarket but eaten at home). This typically makes up more than 50% of total energy usage and carbon emissions (Druckman and Jackson 2008, Chatterton et al. 2016). According to Røpke (2011),

> […]irect energy consumption occurs when households buy energy carriers such as fuel oil, gas, petrol, and electricity, and use it for heating or cooling their dwellings, cooking, operating appliances, and driving their cars. Indirect energy use occurs in relation to the acquisition of all the goods and services where energy has been spent to provide them (p. 935).

In other words, 'the energy directly used for producing consumer items and services can be considered as the indirect energy consumption of households' (Biesiot and Noorman 1999: 370). Building on this distinction, interesting questions emerge concerning the separation of 'domestic' from non-domestic practices, an issue that is highly relevant to any empirical inquiry into household energy use. The blurring of boundaries between home and work attributed to the increasing digitalisation of work serve as a prime example. Similarly, driving a car connects the household to other important sites of production and consumption (e.g. work, leisure activities) and, by extension, different forms of non-domestic energy use, in addition to requiring an energy carrier that is purchased outside home (e.g. petrol, diesel or electricity).

While the distinction between direct and indirect energy use can be useful for structuring empirical investigations, it nevertheless presents some conceptual difficulties concerning both the delimitation and application to actual practices.

> The most basic question concerns the *delimitation of consumption*: What should count as consumption? If consumption is considered to be the ultimate aim of production, then all environmental impacts of economic activities should in principle be attributed to consumption. Consumers are not only "responsible" for the environmental impacts associated with the use of products and services in everyday life, but also for the effects associated with the provision of these products and services. In accordance with this perspective, energy studies usually cover both *direct* and *indirect energy consumption*. […] in general, the indirect energy consumption is estimated to be just a big as the direct in Western households (Røpke 2011: 935).

Recognising the diversity of practices that contribute to domestic energy use, including variations in their (in)visibility and (in)conspicuousness, **ENERGISE focuses its empirical part primarily (but not exclusively) on practices that require direct energy use**. This reflects the idea that practices whose energy requirements are (more or less directly) observable, and that can thus be made visible much more easily to those engaged in them, can offer promising starting points for change initiatives (as opposed to practices whose energy requirements remain largely invisible). For example, since the 2000s EU-wide efforts

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to encourage a switch to more energy-efficient lightbulbs (complementing and perhaps gradually replacing earlier campaigns to get people to switch off their lights to save energy; see Section 5) have helped to raise awareness of the environmental impacts of lighting (e.g. energy use, toxicity levels of different types of light bulbs, or how to recycle light bulbs appropriately).[6] However, due to the small share of overall domestic energy use that lighting represents and partly because of increases in energy demand related to the growing use of ICT and entertainment equipment (de Almeida et al. 2011, Røpke et al. 2010), the switch to energy-saving light bulbs and LEDs has had limited impact in reducing household energy use.

**Figure 1: Household energy consumption by end-use in the EU-27**
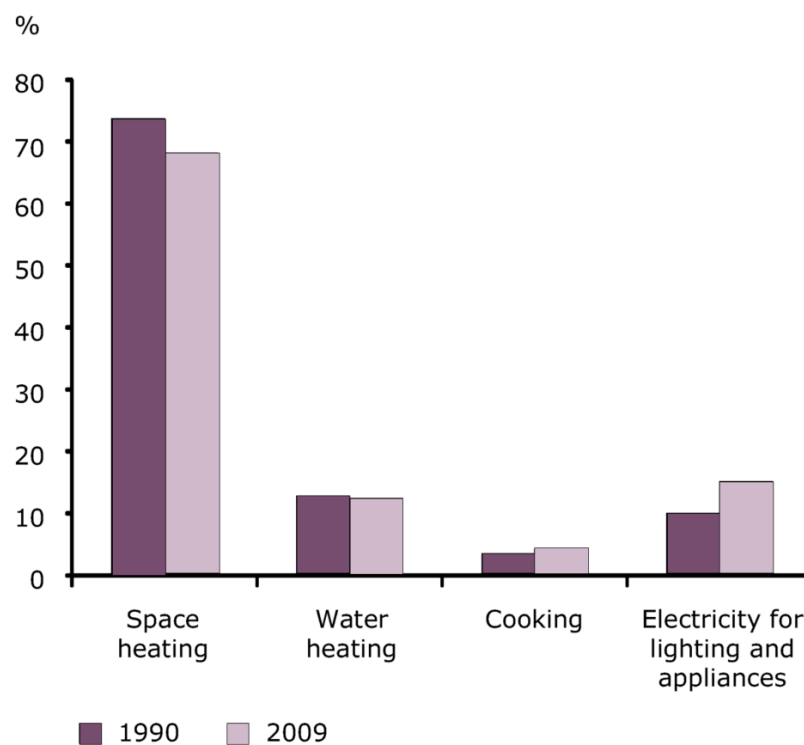


Source: EEA 2012[7]

Similarly, EU legislation on ecodesign and energy labelling has helped to phase out several categories of wasteful products (e.g. Council Directive 2009, 2010).

However, energy use in the EU continues to be stubbornly high, partly because of **rebound effects**[8] following energy efficiency measures that result from intra- and cross-sectoral

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[6] Unfortunately, some of these efforts have been mired in controversy in some countries, fuelling the EU's reputation as an unnecessarily technocratic entity that seeks to regulate the minutiae of people's everyday lives. To what extend this has had lasting effects on the EU's credibility in the environmental policy arena remains unclear. In any case, given that lighting makes up a small proportion of domestic energy use, usually less than 5% (IEA 2014), the EU's efforts to promote more efficient light bulbs has primarily played an educational role (as opposed to providing large-scale energy savings).

[7] https://www.eea.europa.eu/data-and-maps/indicators/energy-efficiency-and-energy-consumption-5/assessment (last accessed 24th July 2017).

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changes in practices. Here, both changes in people's repertoire of practices as well as the deeply embodied nature of people's habits and routines create complex patterns of continuity and change that tend to cancel out at least some of the gains made (Hertwich 2005, Sorrell et al. 2009, Druckman et al., 2011, Wallenborn and Wilhite 2014). For example, a reduction in direct energy use in the home through 'green' measures such as retrofitting residential buildings may be (partly) offset by an income effect where householders spend the money saved on new products and additional services, increasing their indirect energy use in the process.

**Figure 2: Drivers of the change in average annual energy consumption per household in the EU-27 between 1990 and 2009**
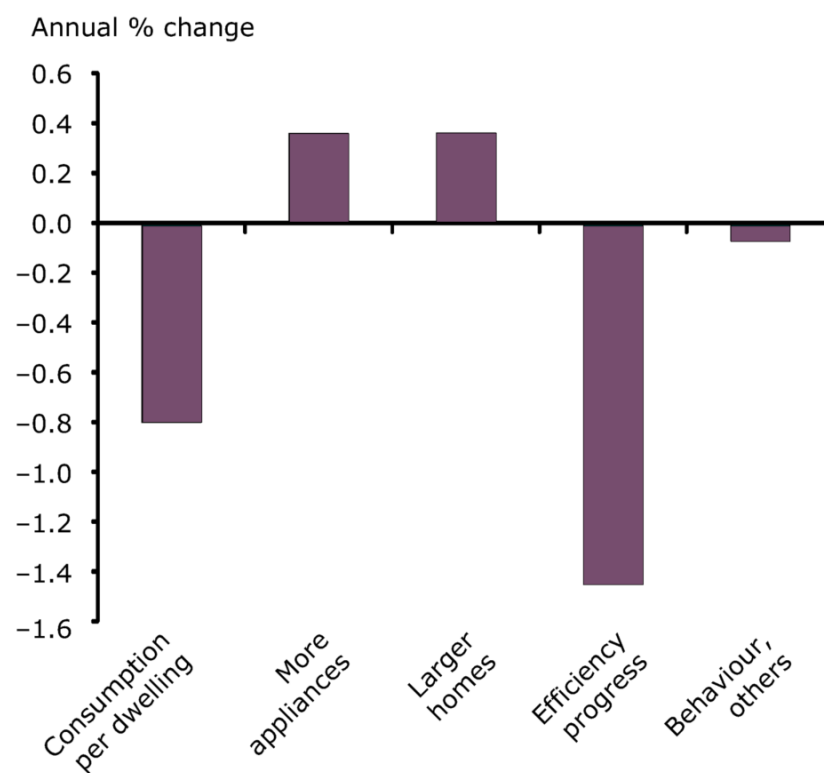


Source: EEA 2012[9]

The (partial) elimination of projected gains through unanticipated changes in practices and associated purchases (e.g. acquisition of new/additional appliances) points towards the **strong influence of daily practices, habits and routines on household energy use, although much energy research, policy and practice continues to ignore this important insight** (Sovacool 2011, Druckman and Jackson 2008, Rau et al. 2017). The importance of understanding the dynamics of consumption and its diverse linkages with social, cultural,

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[8] These differ from backfire effects which describe negative effects of eco-efficiency measures (Hertwich 2005: 86).
[9] https://www.eea.europa.eu/data-and-maps/indicators/energy-efficiency-and-energy-consumption-5/assessment (last accessed 24th July 2017).

economic and material factors at different scales of social organisation cannot be overestimated if progress is to be made towards more sustainable energy use. ENERGISE seeks to address this challenge in new and innovative ways.

Overall, the example of the EU's initiative to phase out incandescent light bulbs has demonstrated the enormous complexity of domestic energy use arising from people's engagement in everyday practices, and related efforts to reduce it (also supported in Genus and Jensen 2017, Jensen 2017). At the same time, the benefits and limitations of drawing attention to certain domestic practices, such as switching off the lights whenever one leaves the room, and related resource use seem to merit further research, in particular across social groups that appear to be engaged in specific practices with more or less significant implications for domestic energy use. This insight is highly relevant to the ENERGISE project which includes an initiative or set of 'living laboratories' aimed at transforming everyday practices in diverse households for the purpose of reducing domestic energy use.

## 5. PRACTICING CHANGE: CONCLUDING REFLECTIONS ON PAST, CURRENT AND FUTURE EFFORTS TO RESHAPE AND REDUCE ENERGY USE

On a practical level, considerable efforts have been made over the past few decades to identify and potentially modify factors that influence how (much) energy is used. A systematic review of past and current energy-related change initiatives in Europe is far beyond the scope of this framework document, in particular given that ENERGISE Work Package 2 will deliver important insights in this regard. Moreover, these insights will subsequently feed into the development, rollout and analysis of ENERGISE change initiatives (WP3-6). It is nevertheless important to briefly sketch two key trends. On the one hand, significant efforts have been made to increase **efficiency** by transforming existing systems of energy provision. Here, actual changes in infrastructure, technology and pricing are intended to promote a more efficient use of energy along the production-distribution-consumption chain. Importantly, these attempts towards more efficient energy use regularly coincide with an observable reshaping of practices, prevailing norms and expectations. For example, changes in heating practices during the second half of the 20th century have mirrored the complex dynamics of infrastructural, technical, social and political conditions, including enormous changes in home heating technology, indoor air quality and expectations concerning thermal comfort (e.g. Chappells and Shove 2005).

On the other hand, there is evidence of both planned and unintended shifts in energy use that relate closely to growing **sufficiency** (Lorek and Fuchs 2013, Lorek and Spangenberg 2017). In fact, many of these occurred in response to serious ruptures (e.g. power cuts due to severe winter weather in 1979), national and international crises affecting fuel supplies (e.g. oil crises in the 1970s, regular energy shortages in some socialist countries with planned economies prior to 1989, wars in oil-rich regions such as the Arabian Gulf) or economic hardship (e.g. during the financial crisis in the late 2000s). For example, following the oil crisis in 1974/5,

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attempts in many Western countries to reduce energy demand increased in scope and frequency, at least for a number of years following the crisis. In 1979 the International Energy Agency (IEA)[10] declared the month of October to be 'energy saving month' and encouraged its member-states, all of which are also members of the OECD, to run large-scale public information campaigns to raise awareness of the need for greater energy efficiency. Similarly, many Eastern bloc countries experienced difficulties maintaining oil and gas supplies during the late 1970s and early 1980s, with energy demand becoming a prime target of state intervention. Measures taken by various governments – East and West – included information campaigns such as those communicated on postal stamps (Table 3).

**Table 3: Stamps from Germany (West and East) and Austria encouraging citizens to save energy**

|  | Country | Year of issue | Source of image |
|---|---|---|---|
|  | BRD (West Germany) | 14th November 1979 | http://www.briefmarken-bilder.de |
|  | DDR (East Germany) | 21st April 1981 | http://www.suche-briefmarken.de/ |
|  | Austria | Autumn 1979 | http://austria-forum.org/ |

Interestingly, some historical examples of energy sufficiency thinking reflect attempts towards energy autarky and (national) self-sufficiency. For example, it is possible to find historical examples of energy policy in the Republic of Ireland (RoI) that revealed a strong ideological leaning towards national self-sufficiency following the country's political independence from Britain in the early 20th century (Manning and McDowell 1985: 100). That said, such efforts have proved largely unsuccessful in the longer term, with rapid increases in per capita energy

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[10] The International Energy Agency (IEA) describes itself as an 'autonomous organisation which works to ensure reliable, affordable and clean energy for its 29 member countries and beyond' and focuses on four key areas - energy security, economic development, environmental awareness and engagement worldwide. All members are also members of the OECD. Importantly, a demand-restraint programme for reducing national oil consumption by up to 10% constitutes a key condition for IEA membership (https://www.iea.org/about/, accessed 8 January 2017).

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demand outstripping domestic supplies leaving the RoI heavily dependent on imported fossil fuels (CER 2016). More recently, examples of sufficiency initiatives in households (Brischke et al. 2016, Lorek and Spangenberg 2017) and communities (Comharchumann Fuinnimh Oileáin Árainn 2012) have demonstrated both the merits and limitations of shifting the focus away from more traditional efficiency thinking. ENERGISE Work Package 2 will cast some light on these developments.

Today, efforts continue in many highly developed countries to increase energy efficiency and lower household energy use through technology-driven interventions such as the installation of smart meters and roll-out of large-scale energy retrofitting programmes (Dietz et al. 2009, OECD/IEA 2014). The introduction of energy efficiency standards and energy ratings for appliances complements these efforts, as exemplified by the aforementioned Ecodesign and Energy Labelling Directives. However, a recent OECD/IEA and EU report entitled *Energy Policies of IEA Countries: European Union 2014 Review* (2014) stated that 'the roll-out of smart meters and the integration of demand response [from consumers] have made slow progress in the  European Union' (p. 54). Moreover, global energy use is expected to grow by 56% between 2010 and 2040 (EIA 2013), with much of this increase being attributable to rising energy use in non-OECD countries (Allouhi et al. 2015).

Efforts to modify everyday practices and reduce energy use in the process have also gained some momentum, in particular in the context of innovative social-scientific and inter- and transdisciplinary energy research programmes in different EU countries. DEMAND, a UK-based interdisciplinary research centre dedicated to the multi-faceted investigation of end use energy demand, has produced many relevant insights into what energy is for and how energy demand can be managed by radically reconfiguring systems of provision and, by extension, everyday practices and their energy requirements.[11] In Germany, a state-funded research programme on the subject of (un)sustainable consumption running from 2008 until 2011 produced a number of outputs focused on changing everyday practices, including those that incur high levels of energy use (Blättel-Mink et al. 2013). This was part of a large-scale funding scheme established in 2001 with the explicit intention of supporting social-ecological research (SÖF) on the subject of societal change.[12] Similar efforts have been made in other countries (e.g. Jalas et al. 2017; see also ENERGISE WP2 deliverables for further information). Despite these promising efforts, the idea of targeting everyday practices and related patterns of energy use continues to receive too little attention from policy makers and other key actors in the energy sector.[13] This is particularly true for initiatives intended to seriously discourage or disincentivise energy-intensive practices to achieve greater sufficiency, perhaps because such initiatives tend to offer fewer opportunities for technological innovation. ENERGISE addresses this omission by systematically considering

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[11] http://www.demand.ac.uk/ (accessed 10 July 2017)
[12] http://www.fona.de/de/gesellschaft-sozial-oekologische-forschung-soef-19711.html (accessed 10th July 2017)
[13] Note that some utility companies are starting to pay more attention, e.g. E.ON Hungary supporting EnergyNeighbourhoods, an initiative focusing on changing domestic energy use by shifting everyday practices.

both efficiency and sufficiency aspects, with a view to developing change initiatives that include the broadest possible range of options for reducing household energy use and that offer opportunities for recrafting and substituting energy-intensive practices in ways that work with people's needs and everyday routines.

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