ENERGISE

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

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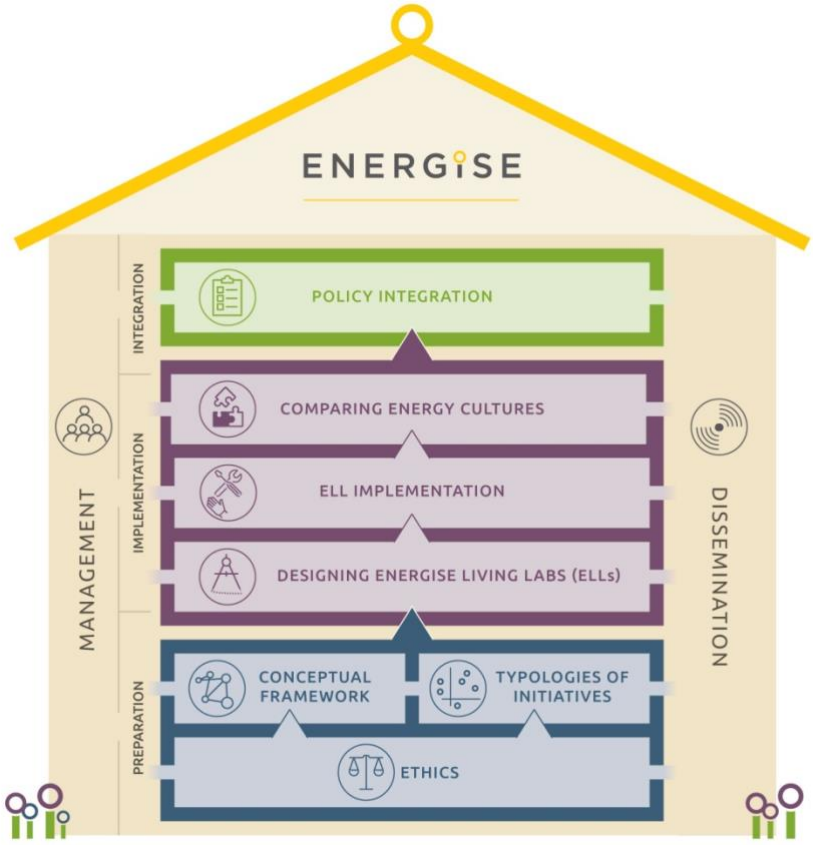
ENERGISE PROJECT

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

- **Develop an innovative framework** to evaluate energy initiatives, taking into account existing social practices and cultures that affect energy consumption.
- **Assess and compare the impact** of European energy consumption reduction initiatives.
- **Advance the use of Living Lab approaches** for researching and transforming energy 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.



EXECUTIVE SUMMARY

This document translates the project findings into insights and recommendations for policy and practice. The report reflects on: a) lessons learned for future research on and the deployment of energy living labs; b) the policy implications of the data analysis undertaken in the project; and c) the significance of the findings for business and other stakeholders. The report draws on previous work reported in earlier project deliverables on policy integration, its conceptual framework, a typology of sustainable energy consumption initiatives and the design and implementation of ENERGISE living labs (ELLs).

The report reflects on the significance for policy of project themes connected with realising a shift towards sufficiency of energy use (rather than 'efficiency') and adopting a focus on innovating everyday energy practices. The deliverable addresses the relevance of methods employed on the project to policy, in relation to approaches for engaging citizens and the use of challenges to 'rupture' existing practices for using energy, e.g. to keep warm at home. This also includes the policy relevance of having combined qualitative and quantitative approaches, required resources to support co-creative living labs, and implementation context. The report outlines areas for future research, such as: the study of practices in other energy use domains than those examined in ENERGISE; how to design living labs to address more effectively the needs and concerns of participants; and potentially a meta-project for monitoring and analysing energy use practices across Europe.

The report considers policy implications connected with the impact of ELLs on energy saving and the scaling up of ELLs. The central message is that changes in daily practices (e.g. reducing indoor heating by 1˚C) can be of great importance were each and every household to adopt them. The report discusses policy development in specific areas such as product standards and labelling, building design and the use of IT to make energy use visible to support households' attempts to reduce consumption. The report takes a pan-EU policy perspective but also considers specific national and local (e.g. city, neighbourhood or community) measures and how to ensure the impact of the project thereon.

The report emphasises the need for policy to employ alternative problem framings of reducing energy consumption. Rather than nudging consumer choices or implementing energy efficiency programmes alone, the 'problem' should be one of identifying and changing deep-seated everyday practices. Engaging citizens in well supported energy living labs could be a more efficient and effective option for doing so than, say a national roll-out of smart meters. ENERGISE provides new thinking about policy integration, interdisciplinary energy research, public engagement and innovation. A new imaginary is proposed in which social science energy research contributes to the governance of energy in European countries and not merely to deliver results to policy-makers in an instrumental way.

The report discusses implications of the project for markets, business and other stakeholders concerning building and interior design and the use of IT for collecting data on everyday energy use practices. It addresses the role of independent advice and user-friendly product design in supporting practice-focused energy saving initiatives (e.g. instructions from clothing manufacturers and manuals for heating systems and washing machines, which are often seen as unhelpful to those who use them).

1. INTRODUCTION

A report for the European Environmental Agency (EEA) on changing behaviour of energy consumers notes that the European Energy Efficiency Directive was introduced in 2012 and is concerned that EU member states would miss targets set for reducing primary energy consumption by 2020 (EEA, 2013). The EEA report (2013: 5) states that to implement the new directive requires changes in 'consumer behaviour and energy consumption practices', the latter of which had hitherto been neglected in studies of energy saving.

From the 2012 Directive let's move forward in time to April 2019, to the publication of the fourth report on the progress of EU member states towards energy efficiency targets for 2020 (European Commission, 2019). This report notes that EU overall energy consumption gradually fell between 2007-2014 but increased between 2014-2017, putting the 2020 target for both primary and final energy consumption 'at risk'. The Commission Task Force set up to examine the aforementioned increases in energy consumption identified a number of causal factors. These relate to poor estimation of energy savings that were not ultimately achieved and (non-) implementation of energy efficiency policies in member states. They also refer to 'insufficient consideration of the impact of behavioural aspects' (European Commission, 2019: 5). There is not the specific reference to practices – as distinct from behaviour – found in the earlier EEA (2013) report.

In terms of sector contribution, it is to be noted that residential energy use increased by 7% between 2014-2017 (European Commission, 2019). According to the European Commission (2019: 8), factors contributing to the increase in residential sector consumption include the 'wealth effect' (reflected in larger and more dwellings), lifestyle changes reflected in increased use of smaller appliances and greater levels of comfort (in public residential buildings). The EEA (2013) reflects on the likely role for direct and indirect feedback – e.g. from smart displays or from energy bills – in enabling consumers to gauge consumption levels and understand where energy savings might be made. The EEA also suggests that there may be an over-emphasis on how to achieve reductions and not enough on what is or may actually be achieved. At the same time, however, the EEA recognises the importance of engaging active consumers in programmes of behaviour and practice change. The above insights form the backdrop to the ENERGISE project, its focus on how to reduce residential energy use, understood from a practice perspective, and the participatory living lab methodology employed.

ENERGISE is a pan-European project funded by the European Commission Horizon 2020 research and technology development framework programme for 36 months between December 2016-November 2019. ENERGISE is funded within the secure, clean and efficient energy part of Horizon 2020 work programme, to generate new insights into the social and cultural factors affecting energy use in households and communities. The project aimed to inform EU and national energy policies. To do so, it constructed and drew upon a database of over 1000 sustainable energy consumption initiatives implemented in 30 European countries. ENERGISE also sought to learn from the experience of designing and

implementing energy living labs in eight countries that are home to project partners. Learning from the project is based on an understanding of the issues from a social scientific perspective that had hitherto been undervalued by researchers and policy-makers. ENERGISE recognises that energy use is not meaningful in and of itself but is so in relation to enabling the performance of routine practices such as cooking or doing the laundry. Collecting data on energy use thus implies a wide set of methods. Indeed, previous studies had emphasised quantitative and technical analyses (see: Jensen et al, 2017; 2019). Whilst ENERGISE does collect quantitative data on energy use, it is concerned to work with participants to build an understanding of the quality of energy use. Here, the concept of 'everyday consumption-related practices' is salient, and the design, implementation and assessment of different types of energy living labs core to engaging with participants, other stakeholders and to the co-design of knowledge in the project.

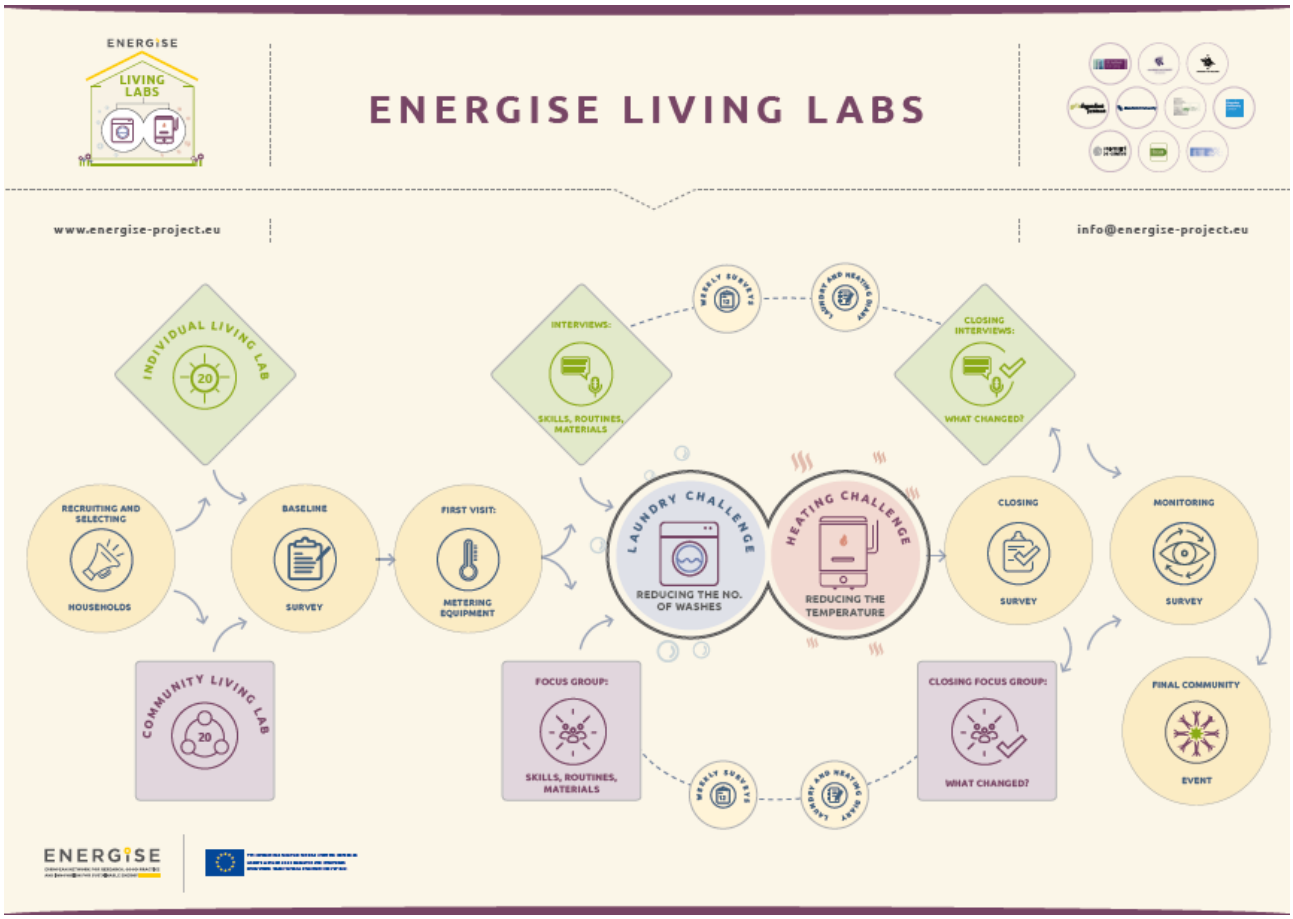
The project implemented 16 ENERGISE living labs (ELLs) – two labs in each of eight countries[1], implemented by consortium partners and members of local implementation teams in the autumn/winter of 2018-2019. The aim was to experiment with and assess different options for reducing energy use in households across Europe, focusing on everyday practices in two domains: space heating and laundry. In each country, there was one living lab comprising a maximum of 20 households, participating on an individual household basis. This was designated ELL1. Each of the eight countries also implemented a collective ELL (sometimes referred to as a 'community' living lab, based on the locale or neighbourhood principle and/or shared interest), again comprising up to 20 households and known as ELL2. The participants in the collective ELLs were able to meet and interact with each other, for example in focus group meetings but also in other ways, e.g. through social media, including some not instigated or facilitated by the project team. In total, 306 households took part in the study. The activities undertaken by the ELLs are shown in Figure 1, below.

The implementation of the ELLs generated a number of insights that form the core of this report. In presenting and synthesising the project findings, this report draws on previous work reported in earlier deliverables on policy integration (Genus and Iskandarova, 2018; 2019). It also draws on the conceptual framework developed in Rau and Grealis (2017), the typology of sustainable energy consumption initiatives constructed early in ENERGISE (Jensen et al, 2017), the living lab methods summarised in Heiskanen et al (2018) and Laakso et al (2019) and data analysis presented in Sahakian et al (2019). The findings are discussed in relation to contributions to knowledge and policy learning in the following sections of the report. Section 2 considers the implications of ENERGISE for research on and the future deployment of energy-related living labs. Section 3 addresses policy implications connected with the impact of ELLs on energy saving and the scaling up of ELLs. It also discusses policy development in specific areas such as product standards and labelling, building design and the use of IT to make energy use visible to support households'

[1] The eight countries implementing ELLs were: Denmark, Finland, Germany, Hungary, Ireland, The Netherlands, Switzerland and the United Kingdom

attempts to reduce consumption. The discussion takes a pan-EU policy perspective but also considers specific national and local (e.g. city, neighbourhood or community) measures. There are implications of the project for markets, business and other stakeholders and organisations – these are outlined in section 4. Section 5 outlines specific insights and recommendations for countries in which ELLs were implemented, as well as steps being taken to enhance the impact of ENERGISE findings in ELL countries. Section 6 summarises and reflects upon the work of the report as a whole.

Figure 1: Activities in ENERGISE Living Labs
See: http://www.energise-project.eu/livinglabs



2. RESEARCH ON AND FUTURE DEPLOYMENT OF ENERGY LIVING LABS

The primary contribution of the ENERGISE project lies in its attention to the potential role of households in transforming the energy system or realising the energy transition. In particular, the impact of the ELLs has been to make households more acutely relate to the level and nature of energy use in the performance of everyday laundry and heating practices. Furthermore, the aim has been to shift the attention from energy efficiency

towards the *sufficient* use of energy. This entails reductions in energy use and innovations in the ways in which people go about their daily lives. For heating, the project testified to the reduction of levels of energy consumption in absolute rather than in relative terms whilst the laundry challenge saw relative reductions. Both domains, however, drew attention to ways in which everyday activities can be done differently. This focus on innovations in practice adds to an emerging literature, which addresses the need for change in practices to redress over-reliance on approaches that emphasise technological innovation, energy efficiency or individuals' behaviour or purchases (Goggins et al, 2019; Jensen et al, 2019; Keller et al, 2016).

ENERGISE attests to the potential rupturing effect of designing challenges to existing practices of household energy use in the two domains of heating and laundry. They are ruptures in the sense that they are for participants a break from the 'normal' routines, which bring to mind and body practices that are typically taken for granted as people go about daily living. The rupture, and the challenges that households took, evoked reflections on everyday practices, and particularly questioned social norms around thermal comfort and cleanliness. These ruptures are not confined to these challenges, though the challenges are perhaps the most explicit and arguably most salient aspects of the approach. The challenges are manifest in the challenge cards on which were written the participants' commitments to change household heating and laundry practices. Ruptures are created in the initial 'baseline' meetings and survey, around which point the aims of the project are discussed in more detail, an outline having being given at the first recruitment stage, and data monitoring and metering equipment installed in homes. 'Deliberative' interviews and ELL2 focus group meetings afforded opportunities for participants to confront everyday practices having detailed discussions guided by the researchers, and allowing a 'co-creation' of new practices through setting particular targets/challenges. The focus groups meetings of ELL2 allowed participants to reflect on their own household practices as these compared with those of other ELL2 members. Overall, the challenges, data collection and engagement methods enabled participants to reflect upon, change and monitor their everyday practices. The ELL approach created a space for change in which participants could be creative with new ways of feeling clean and comfortable. Details of the ELL approach are available at the project website at the following link: http://energise-project.eu/livinglabs

The combination of qualitative and quantitative elements makes the living labs a very effective way of helping participants to recognise, confront and change everyday practices of energy use. However, there are some critical insights that need to be borne in mind when implementing such initiatives. Fundamentally, the ELLs are demanding of resources. They require a significant investment of time, funding and research staff with the required knowledge and skills. It should be noted that other types of initiatives are also demanding of resources. For example, in the UK the current smart meter roll-out is beset by technical difficulties and spiralling costs. It has been estimated to cost around £370 (€425) per dual-fuel household, according to the National Audit Office (2018), whereas per household the ELL implementation budget works out at £130 (€150).

Effective ELL implementation requires local knowledge and contacts with agencies that can facilitate formation and effective operation of local implementation teams. Further, interventions need to be tailored to the context in which they are being implemented (Heiskanen et al, 2018). Experience gained from ENERGISE shows that working with participants from minorities or less advantaged socio-economic groups may necessitate provision of translation services, or deeper consideration of cultural factors influencing energy use practices, data collection and reflection processes. The prevalence of 'embedded' energy champions within the group may engender trust and facilitate interaction between the group members and the implementation team. Overall, ELL implementation is likely to benefit from due consideration of for and with whom the interventions are designed, as well as the purpose and impact of initiatives.

Project funders and implementation teams alike need to be aware of connections between the project aims and activities and the self-identity and sensitivities of participants. For ENERGISE, this was illustrated by sensitivities around discussing and challenging laundry practices (e.g. in terms of wearing items for longer than 'normal'). It was also demonstrated by instances of participants lagging or exceeding the (perceived) expectations or scope of the project. One example is where participants who thought of themselves as already conscious of environmental issues or active in that field, showed concern that ENERGISE lacked a political edge or enshrined a political position that individualised climate change-related action.

Some areas for future projects include more work focusing on the domains investigated by ENERGISE (household heating and laundry) but also practices in other energy use domains, such as lighting, mobility or practices related to cooking. Evidence from evaluating other projects (see e.g. Jensen et al, 2017) shows that having a variety of different domains from which households can choose might enable domains to be adapted to the particular needs and concerns of participating households and thus heighten their commitment to initiatives. This may however complicate the work of researchers for whom a limited number of domains might be more practicable. Conclusions from the ELLs also suggest examination of dwelling or building design relevant to practices, or as it relates to specific phenomena or sites such as childhood and work places, the role of IT in making energy use more visible and in data collection. A somewhat different suggestion is the 'lab of labs' – a kind of meta-project or observatory, which would monitor, compare and analyse energy related living labs across Europe.

3. POLICY IMPACT AND IMPLICATIONS

It is apparent that embedding initiatives like the ENERGISE Living Labs has great potential over the longer-term to make an impact on reducing household energy use in different European countries and in reducing CO_2 emissions (see Table 1 in Sahakian et al, 2019). Specifically, assuming that households are at an average baseline in relation to energy use and excluding households experiencing energy poverty:

- **Reducing indoor temperatures by 1°C** in the winter months is possible and not *uncomfortable*. Directly after the challenges, households taking part in ENERGISE living labs were able to reduce indoor temperatures by (on average) 1° C in living rooms, comparing the temperature before and after the challenge. The challenge, which most households agreed to, was to reduce the indoor thermostat temperature setting to 18˚C.

- **Reducing by 1 laundry cycle per week** is possible and not *inconvenient.* Directly after the challenges, ELL households were able to reduce laundry cycles (on average) by one cycle, comparing wash cycles before and after, and for those who were not already below a certain threshold. The challenge was expressed as halving the number of laundry cycles done in a given period. Energy and water use can also be reduced through shorter cycles, or lower temperature settings, along with less use of dryers and less ironing.

Table 1: Average changes in reported temperatures and wash cycles during ELLs (8 countries)
(Source: weekly surveys; averages taken before challenges, and during challenges)

Change in temperatures		Change in weekly wash cycles		
Living room	**Bedroom**	**Family of 2**	**Family of 4**	**All**
From 21.12°C to 20.16°C	From 19.97°C to 18.58°C	From 4.3 to 3,2	From 4.1 to 3.0	From 4.2 to 3.1
1 degree (0.96°C less)	c. 1 and a half degrees (1.39°C less)	1.1 cycle less (26% reduction)	1.1 cycle less (26% reduction)	1.1 cycle less (26% reduction)

The central message is that even seemingly small changes in daily practices, like reducing the temperature set on the central heating thermostat by 1°C can be of great importance were each and every household to adopt them. A similar comment applies to households doing one less cycle of laundry, though this will have less of an impact on CO_2 emissions than the aforementioned temperature change (but water and detergent use will likely fall). For both domains and across all ELL countries, the changes to laundry and heating practices can generally be accomplished without disrupting comfort. Boxes 1-3, below, illustrate the how the ELL findings translate in quantifiable terms to policy in three countries in which living labs were implemented: Switzerland, Hungary and the UK. There were important qualitative changes, such as those connected with challenging norms about how long clothes could be worn before washing, or the use of other ways to consider or keep clothes presentable without putting on the washing machine. In contrast to ENERGISE, a number of the sustainable energy consumption initiatives reviewed were based on information-deficit models and had, very limited or no impact in changing *practices*.

Box 1: Example from Switzerland: how the key policy message translates to the Swiss context[2]

All sectors have a role to play in reducing and improving energy use across Europe. If households are to play a role in transforming energy systems, and assuming that such households are at an average baseline in relation to energy use (i.e., excluding households experiencing energy poverty), the following savings are possible over a one-year period:

- one less laundry washing per week per Swiss household for a year represents a saving of around 13 million m3 of water (more than 5,000 Olympic-size swimming pools), 10 million litres of laundry products and the equivalent annual electricity consumption of 90,000 households. One less laundry cycle per week is also estimated at saving one hour of domestic work per week.

- a 1°C reduction in room temperature, during the winter months when buildings are heating, results in an estimated saving of 6% of all energy dedicated to heating homes in Switzerland. This represents almost twice the energy needed for all laundry and drying requirements in Switzerland for one year.

Box 2. Example from Hungary – laundry-related energy and CO_2 savings[3]

The analysis of data (laundry diaries) shows that there was a 24.3% saving in electricity use in the participating households. If all households in Hungary reduce their washing machine-related electricity consumption by the same percentage, and keep up this reduced consumption, in one year the emission of 32,908 tons of CO_2 could be avoided. This amount of CO_2 equals to the annual CO_2 emission of about 6,800 average Hungarian citizens.

Box 3. Examples of potential energy savings from the United Kingdom

More than half the money spent on fuel bills goes towards providing heating and hot water.
Installing a room thermostat, a programmer and thermostatic radiator valves and using these controls efficiently could save a household around £75 (€86) a year. Turning down the room thermostat by just one degree can save around £80 (€90) a year (figures for Great Britain).[4]

Moreover, it is estimated that the savings from such changes to routine practices, if they were adopted across Great Britain's whole housing stock over a year, could be huge. For example, turning the thermostat down by 2 degrees from 20°C to 18°C could save 33 TWh; turning it down by 1 degree from 19°C to 18°C could save 16 TWh; washing clothes at 40 degrees or less' may save 0.4 TWh. These calculations help understand the size of the potential for energy savings in Great Britain.[5]

2 See: Sahakian et al, 2019
3 Vadovics, E. and Pap-Szuromi, O. (2019) Living Lab Country Report – Hungary https://zenodo.org/record/3345849#.XbB3w-Sou70
4 Energy Saving Trust. Energy saving quick wins. https://www.energysavingtrust.org.uk/home-energy-efficiency/energy-saving-quick-wins
5 Palmer et al, 2012

The project makes several fundamental points regarding how policy-makers can approach policies for changing how households use energy. These concern the ways in which energy policy problems are framed and researched. Having identified and categorised over 1,000 sustainable energy consumption initiatives across Europe (Jensen et al, 2017), ENERGISE recommends greater attention to initiatives that focus on "changes in everyday life situations" and "changes in complex interactions" among practices, rather than those that frame the 'problem' in terms of behaviour change, energy efficiency and/or the application of technological solutions (Jensen et al, 2019).

ENERGISE promotes learning, predicated upon a reframing of the problem to be addressed as how to change practices associated with everyday needs such as keeping warm and having clean clothes (Rau and Grealis, 2017). Thinking about the problem in this way, draws attention to different elements of energy practices (technical, symbolic and skilful) and connections among different practice domains (e.g. between heating and drying clothes indoors but not in a washer-dryer). It also requires thinking about connections among households and through society, which institutionalise social norms, meanings and cultures of energy use. These relational and cultural aspects might make practices of energy use appear obdurate but ENERGISE shows that they may also provide the basis upon which insightful and effective initiatives may be built. This is quite different from understanding energy use in terms of the demand for energy services.

In terms of researching energy practices, the ENERGISE project suggests that greater understanding is required of what existing and changing energy use means to households. To make sense to households, projects need to involve participants as active agents in the research and practice change process. This may require funders, policy-makers and researchers to rethink their 'normal' role in such activities, in which they conventionally have been commissioners, project designers or users of findings. In addition, (some) householders may have come to expect through direct experience or assumption to be passive subjects in research projects and may need support to enable them to assume more critical and participative role in such initiatives. Overall, however, the ENERGISE project shows the value of an 'imaginary' of policy relevant social scientific energy research, which prizes the co-creation of knowledge about energy practices and cultures and how they might be transformed. This alternative imaginary should *replace the prevailing perspective* that emphasises social acceptability of behaviour change measures and how to 'nudge' individuals towards making better energy choices.

In short, the ELLs indicate that EU and national policy development may need to consider the following:

i) establishing initiatives based upon the performance of daily practices, habits and routines: policy makers should employ a new perspective of energy policy design based on good understanding and appreciation of practices, habits and routines and their influence on household energy use.
ii) invoking the concept of sufficiency in relation to energy consumption: it brings to the fore more fundamental understanding of what matters to people. It opens a window on practices that might have been left closed by energy efficiency

programmes, and instigates changes that might not be achieved by efficiency schemes alone, e.g. by shifting the focus to domains of 'cleanliness' and 'thermal comfort' instead of more traditional efficient energy use.

iii) 'upscaling' practice-focused sustainable energy consumption initiatives and developing new insights into what constitutes upscaling and how it can be achieved;

iv) employing complementary energy efficiency measures – such as building smaller dwellings and improving product labelling and standards – within practice-focused initiatives;

v) employing IT to *complement* measures designed to assist users as *they* attempt to challenge themselves to change practices of energy use (i.e. in contrast to centrally devised, technology-led interventions);

vi) recruiting and maintaining engagement with different socio-economic groups and types of household with different approaches; and

vii) both individual household and collective energy living lab approaches may be effective, where both types are well supported and resourced, as occurred in ENERGISE.

The authors of this report conducted a review of previous work on integration of social science energy research with policy. The review showed that policy-makers need to be mindful of policy integration issues posed by any incompatibility across measures being considered, or of rebound effects. In the ELLs, some problematic sites included apartments where householders had low control over heating temperatures or there was heating spillage across dwellings. Again, there could be trade-offs, from the householder's point of view, between reducing temperature settings for heating rooms and the perceived need to keep young, old or sick family members warm.

The notion of 'upscaling' good practice approaches, as an object of policy may need to be rethought. Instead of scaling up apparently successful but local approaches nationally or supranationally, amplification represents an alternative organising principle. Amplification relies upon institutionalisation of similar projects to ENERGISE, though designed and implemented in a context-sensitive manner, rather than through transfer of a generic template to new sites. Amplification also hinges on the extent to which changes in practices can be achieved and disseminated. In policy terms, the ELLs draw attention to the potential contribution of, for example, new codes, standards and "official advice". As far as dissemination is concerned, amplification can occur through the viral effect of discussion and circulation of ideas amongst participants and family/friends/colleagues using social media or offline. Media partnership can play a crucial role for amplification from an early stage of ELLs.

There are several policy implications for local and national policy initiatives and political decision making. Due to local characteristics of the ELLs, it is suggested that one way to take the results forward is to engage local authority officials working on sustainable cities in local implementation teams or expert panels. Another local or regional policy implication is to tie the project with the local climate initiatives, e.g. goals to become carbon neutral. This

gives concrete examples and tools (also discursive resources) to those who might be able to diffuse results and carry out further similar local initiatives.

The timing of the ENERGISE Living Labs was promising because IPCC published its latest climate change report and results during the active phase of the ELL implementation. This resulted in media attention for ENERGISE (in some countries, including Finland). However, the timing is always a bit uncertain and this was due to chance. It is suggested that what can be learned from this is to continue to carry out European-wide initiatives to promote sustainable energy practices, which can gain momentum from opportune external conditions when such occur.

4. IMPLICATIONS FOR BUSINESS AND OTHER STAKEHOLDERS

The ELLs provide evidence of connections among material arrangements and other elements of practices. Thus they suggest changes that may be made to the physical design and layout of households which may be conducive to new heating or laundry practices and energy use more generally. Designers might enjoy greater flexibility in building design if a range of temperature settings is allowed for, taking into account variability in levels of thermal comfort (e.g. in an apartment block), rather than working to fixed or a narrow range of settings. In large open spaces, sliding doors might be installed to keep heat in. Examples of design changes might include the provision of aired closets, racks for clothing or dwellings with laundry space built-in. Such products might be diffused via interior designers; indeed market segments for such goods could grow significantly or be created, depending on the national context in question. Some participants in certain ELLs themselves suggested that digital devices (e.g. smartphones) could be used to collect data on everyday heating practices, such as thermostat temperature setting. This may indicate an opening in the market for development – or greater diffusion – of an app with such functionality. Of course, as well as being mindful of the energy used by such devices, there were other participants who do not use or do not have access to such technology. These households may benefit from other approaches to providing support data, which may not yet be available.

The ELLs point to the need for more sources of independent advice, particularly in relation to laundry standards, in supporting practice-focused energy saving initiatives. Specific examples include the nature of instructions from clothing manufacturers with respect to care labels. These are seen by living lab participants as unhelpful, particularly in relation to items which have typically been washed at higher temperatures. (The prevalent idea of the ‘hot wash’ was a tradition handed down in some households, in which it was believed that colder temperature washes would not kill bacteria). In terms of heating standards, one difficulty concerns the subjective nature of what temperature is perceived as being warm enough. For example, in the case of the UK the suggested room heating temperature is 19˚C according to the recent advice from the Committee on Climate Change. The ELLs remind that notions of comfort are social; one-size-fits-all recommendations for ideal temperature settings may not be well adapted to real-world situations in which ‘comfort’ is context-specific and settings are determined by the range of people who live in or visit homes. The need for

more user-friendly designs in supporting changing energy practices is a source of concern, for example in relation to what ELL participants see as overly complicated products, features of which they will never get to know or use.

5. POLICY RECOMMENDATIONS FOR THE ELL COUNTRIES[6]

One of the goals of the ENERGISE project is to achieve policy impact at the national level, to influence the discourse and potentially to help reconceptualise policies in the areas of energy saving and sustainable consumption.

Below is a summary of recommendations developed in the course of the ENERGISE project and key messages regarding sufficiency, changing practices, experimentation/living labs and citizen engagement. There are also some specific recommendations for policy makers and other actors in each national context, that have been developed by the consortium partners.

Depending on national policy context, policy recommendations based on ENERGISE findings complement but also challenge the existing policy framework and the direction of policy development in individual countries. Thus, ENERGISE findings can provide inspiration for and inform ongoing policy measures, e.g. in relation to demand response, energy advice services for buildings, visualisation of energy use, communication campaigns, development of individual metering and monitoring of heat consumption. However, they do fundamentally suggest moving away from approaches that portray citizens as passive consumers and recipients of government policies (like smart-meters) or as subject of policy 'nudges' to purchase more energy efficient products. Instead, they might seek to empower citizens to effect change themselves or with other agents, in processes that include households in the design, implementation and evaluation of sustainable energy initiatives.

Policy recommendations for The Netherlands call for effective policy guidance for undertaking experimentation with people's energy-intensive practices in order to create more sustainable lifestyles; this would require long-term support, continuity and attention to scaling up. Energy conservation publicity campaigns can still, however, play an important role and may boost public awareness of energy saving and environmental concerns. It is also proposed that targeted and tailor-made incentive policies might be more effective than uniform policies in the Dutch context. A similar suggestion is made for the UK regarding implementation of local, contextually sensitive approaches to citizen engagement.

Policy recommendations for Ireland aim to help implement the ambitious Climate Action Plan 2019 by suggesting a reconfiguration of production and consumption practices, socio-

6 This section is based on information provided by consortium partners and the policy recommendations they formulated for their countries (Denmark, Finland, Germany, Hungary, Ireland, The Netherlands, Switzerland, the UK). The national policy recommendations (national policy briefs) developed for this deliverable will be made available on ENERGISE national consortium partner websites.

technical approaches that are culturally sensitive, a need for appropriate financial, technical and other support for sustainable energy initiatives. In addition, there is a need to align policy interventions in related areas such as education, building standards, infrastructure, taxation, and subsidies to enable such efforts.

The key ideas underpinning policy recommendations for Germany are about ensuring that people are tangibly (re)connected to their energy use, and the need for space and support for challenging unsustainable norms. In policy recommendations for Denmark, the emphasis is also on challenging existing social norms and people's perceptions (e.g. regarding indoor room temperature) rather than developing energy efficient technologies. The role of powerful actors working within the building sector could be crucial for translating (new) norms related to comfort and floor space into building standards.

Complementarity of sufficiency-oriented initiatives with existing energy efficiency technologies and related policy measures are particularly emphasised for Hungary and for the UK. In the UK the project findings can inform interventions such as the Smart Metering Implementation Plan 2013, the Smart Meters Act 2018 and related campaigns. It is suggested that in future such initiatives be implemented based on an understanding of energy use practices gained by employing a practice perspective. Such a perspective recognises material arrangements, such as smart metering infrastructure, as but one of the interacting elements of practices.

The commitments of national governments to achieve net-carbon neutrality (Finland)/net-zero carbon emissions (Ireland)/net-zero greenhouse gas emissions (UK) will inevitably have implications for energy users. These commitments may mean greater flexibility e.g. in the use of heat as the move is made to reliance on more intermittent power sources like renewable energy. In countries like Finland, where traditionally heating demand has been rather inflexible due to central heating and district heating, this creates additional challenges for demand response and for heating policies. Recommendations for Finnish energy and heating policies may allow people to control their indoor heating more, with benefits to health as well as for more flexible energy use and demand response. This can partly be achieved by requiring revision of the upper limits for indoor temperatures and when renovating heating systems in buildings to reduce the overheating of buildings.

The project findings are also interesting and relevant for realising UK net-zero greenhouse gas emissions scenarios for 2050. Here, the Committee on Climate Change has identified actions that can be taken by individuals and households, e.g. setting thermostats for room heating to no more than 19˚C. ENERGISE shows that in ELL1 average temperatures fell from 19.4˚C to 18.5˚C during the challenge. This indicates that the temperature target of 19˚C suggested by the Committee on Climate Change is achievable (at least by some categories of households). A different, more nuanced, approach in relation to indoor temperature is suggested for Germany. This involves reviewing the practice of recommending common indoor temperatures independent of key demographic influences (e.g. age, lifestyle, gender, etc.) and increasing knowledge about healthy temperature ranges rather than prescribing optimal temperatures.

The recommendations regarding laundry practices are particularly relevant in countries where the gender role divide is still very prominent, resulting in uneven distribution of labour in households. Reducing and changing everyday practices that are mostly performed by women creates greater balance in the gender division of work in the home. It is also proposed that policy recommendations can be applied to other domains of energy use, such as personal transport, which is a key issue for climate and energy policy in e.g. Finland.

The centralised character of energy policy in some countries (e.g. Hungary) means that achieving policy impact in the short- and medium-term is more likely when taken by a municipality or locality. This becomes important in the light of local energy and climate strategies being prepared or updated by municipalities. Thus, the main focus in Hungary is on municipalities and expert organisations. In Denmark, a similar approach to disseminating policy recommendations is adopted with a focus on municipalities/local authorities.

The national policy recommendations are being disseminated through various channels, including events organised by consortium partners in each ELL country. Consortium partners are sending out policy briefs along with press-releases to interested stakeholders, as well as presenting policy recommendations through research and education platforms and at the events organised by some of the key players in the energy field. One of the purposes of the dissemination activities is to facilitate implementation of policy recommendations and to achieve an impact on policy locally, regionally and/or nationally.

A more ambitious goal shared by the ENERGISE consortium is to influence and shape the terms of the debate around energy consumption in national policy arenas and in EU energy policy-making discourse. Examples of events organised or planned to effect dissemination and impact of the project are: an expert and policy workshop with multiple stakeholders (November 2019, Hungary); presentations at IPCC-related conferences involving government bodies and researchers (Hungary); a workshop with practitioners and researchers on the application of innovative living lab approaches in local, national and EU energy policy-making e.g. within GB Green Energy Week (Spring 2020, UK); presentation of findings to a Geneva energy utility company (end of 2019, Switzerland); and a forum organised by the University of Geneva, with representatives from regional and local authorities, the City and State of Geneva (Spring 2019, Switzerland); a workshop facilitating discussions across local policy, industry and civil society (Spring 2019, Denmark)

The range of interested stakeholders goes beyond national policy makers or regional/local authorities and includes other key players, for example: industry representatives and trade bodies for energy suppliers, consumer associations, NGOs, advisory organisations, citizen groups with an interest in energy and sustainability and educational organisations. Table 2 provides a list of proposed recipients of policy recommendations in 8 countries.

Table 2: Proposed recipients of national policy recommendations

Stakeholder type	Examples
Government bodies and organisations	Ministry of Environment (Finland) Umwelt Bundesamt – Environmental Protection Agency (Germany) Deutscher Städtetag – German Council of Municipalities Ministry for Innovation and Technology (Hungary) Ministry of Agriculture (Hungary) Sustainable Energy Authority of Ireland Enterprise Ireland Regional energy agencies (Ireland) Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieu – Ministry of Housing, Spatial Planning and the Environment (The Netherlands) Rijksdienst voor Ondernemend Nederland – Netherlands Enterprise Agency Federal Office for the Environment (Switzerland) Swiss Office of Energy Department for Business, Energy & Industrial Strategy, Home Energy Unit (UK) Committee on Climate Change (UK)
Regional and local authorities	Carbon-Neutral Municipalities network – HINKU (Finland) Roskilde Municipality (Denmark) Bürgerstiftung Energiewende Oberland – Energy Transition Oberland (Germany) Municipalities of Budapest, Göd, Kaposvár, Alsómocsolád (Hungary) Cantons of Geneva and Vaud (Switzerland) City authorities of Geneva, Lausanne, Montreux, Meyrin, Bernex, Onex, Ecublens (Switzerland) Hastings Borough Council (UK) Local Enterprise Partnership (UK)
Industry actors, energy providers and trade associations	Finnish Energy (trade association of Finnish energy companies) Industrie- und Handelskammern – Chamber of Commerce (Germany) Schornsteinfeger Landesinnungsverband – Chimney Sweeps Guild (Germany) TenneT, the Dutch state owned Transmission System Operator SIG Genève, utility provider (Switzerland)

	Romande Énergie, utility provider (Switzerland) eSmart, Smart homes provider (Switzerland) Engie, Energy services provider (Switzerland) Energy UK NCC (Denmark) Electrolux (Denmark)
Other stakeholders (NGOs, civil society organisations, citizen groups, energy advisory bodies etc.)	Motiva – expert organisation promoting the efficient and sustainable use of energy (Finland) Bundesverband Klimaschutz – Federal Association for Climate Protection (Germany) Bund für Umweltschutz und Naturschutz Deutschland – Friends of the Earth (Germany) Naturschutzbund Deutschland – Nature and Biodiversity Conservation Union (Germany) Verbraucherzentrale – Consumers Association (Germany) Hungarian Energy Efficiency Institute Hungarian Society for Environmental Education Association of Environmental Enterprises (Hungary) Energy-Efficient Wekerle (Hungary) Clean Air Action Group (Hungary) Association of Green Youth (Hungary) Forest Schools Association (Hungary) HIER Opgewekt – knowledge platform for local sustainable energy initiatives (The Netherlands) Milieu Centraal – public information organisation on sustainable choices (The Netherlands) Fédération Romande des Consommateurs – consumer association and lobbying group in French-speaking Switzerland Terre des hommes (Switzerland) Energie Genossenschaft – Cooperative for renewable energy production (Switzerland) Big Effects Foundation (Switzerland) Energy Saving Trust (UK) Community Energy England (UK) Community Energy South (UK) ENERGISE Sussex Coast (UK) Carbon Trust (UK)

6. CONCLUSIONS

The ENERGISE project grew out of several related concerns. These concerns connected with the idea that continued attention to behaviour change, energy efficiency programmes and technical solutions neglected the need to change consumption practices in order to reduce household energy use across Europe and related CO_2 emissions. At the same time,

there was – and still is – a concern about what kinds of social science and humanities energy research could produce new insights of relevance to EU and national energy policy-making. Overlaying this, policy-makers have over the last twenty-five years or so become more aware of the need to engage citizens in efforts to limit the degree and impact of human-made climate change. This need for policy-makers to elicit the support of key stakeholders and users is indeed only a facet of erstwhile concerns pertaining to the realisation of effective policy integration. In parallel, (some) researchers have embraced new modes of knowledge production, struck by the potential benefits of greater interdisciplinarity and co-produced knowledge with non-professional participants, for insightful and impactful energy research (Gibbons et al, 1994). In the 2010s, living labs have become something of a 'hot topic' (or method, at least), seen as a way of creatively experimenting with, in the case of ENERGISE, approaches to changing practices for energy use in the home.

In response to the above, ENERGISE underlines the importance to energy saving of understanding and changing what might seem rather mundane energy use practices, performed in and by households as members seek to keep warm and their clothes clean. Broadly speaking, households can reduce indoor temperature settings in colder months by 1˚C without experiencing a reduction in thermal comfort. They are also able to do one less cycle of laundry without being inconvenienced. Furthermore, the project shows that providing ruptures to 'normal' practices stimulates reflection on the part of householders about how they use energy. Also, this rupturing can provoke discussion within and beyond the home about energy use practices, not limited to the particular energy domains of interest to an initiative or project.

The type of social science energy research that was conducted to produce these insights relies upon a mix of approaches and disciplines and the engagement of households, whether acting individually or collectively in the two types of living labs established in the project across eight European countries. However, the fundamental point rests on the need for and benefits of employing alternative problem framings to those conventionally applied to energy consumption research and to appreciate these within a new practice-focused imaginary of policy-relevant social science energy research. To reiterate, this means reframing the problem of reducing household energy consumption as one of identifying and changing deep-seated everyday practices, rather than as nudging consumer choices in the right direction, or implementing energy efficiency or technological programmes. Fundamentally, an alternative imaginary is proposed in which social science energy research contributes to the governance of energy in European countries and the EU, and not merely to deliver results to policy-makers in an instrumental way. This imaginary is predicated upon methodologies in which diverse policy, research and civil society actors together generate and draw upon insights from energy consumption projects. In projects such as ENERGISE this draws in new thinking about policy integration, interdisciplinary energy research, public engagement and innovation as changing user practices. All this in turn demands reflection upon the state – and transformation – of policy and research cultures, as well as cultures of energy use and practice in and across particular energy domains.

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