ENERGISE

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

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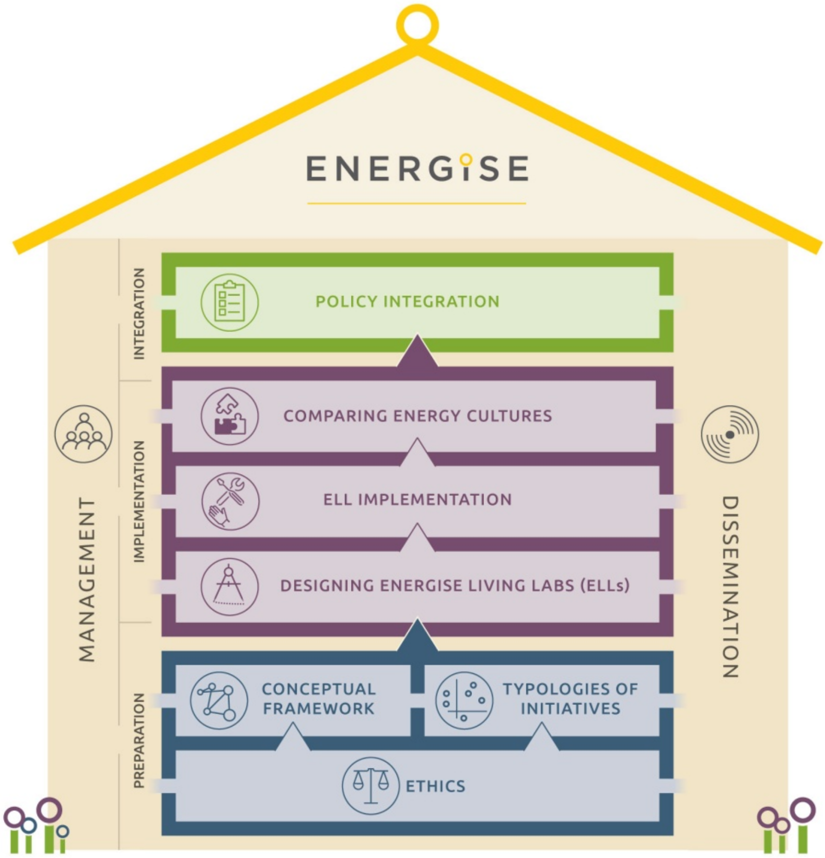
ENERGISE PROJECT

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

Living laboratories have emerged as a novel way for researchers, organisations and municipalities to experiment with and learn about new technologies, products and social innovations in real-life contexts. By drawing on practice-based approaches in living labs, as well as previous experience on initiatives that aim to change energy-related household practices, this document introduces and describes initial designs for ENERGISE Living Labs (ELLs). The document also briefly discusses the prerequisites that the design poses for potential target groups and the sites in which the ELLs are to be implemented later in the ENERGISE project[1].

The starting point for the design of ELLs is the understanding of energy use as a material expression of people's performance of everyday practices and associated cultural conventions. The document defines ELLs as targeted initiatives to transform energy use in households and communities that address (1) individual-level, organisational, institutional and societal (i.e., contextual) influences on household energy-related practices, (2) the relationship between routines and ruptures in shaping energy cultures, (3) the prevention of rebound and 'backfire' effects in initiatives, and (4) policy options for changing energy use through individual-level and community-based initiatives to shift unsustainable energy cultures. On the basis of previous work done within the ENERGISE project, ELLs will incorporate good practice measures that are relatively context-independent and that are expected to work (more or less) across European energy cultures, and context-dependent measures for modifying energy use that are likely to work differently in diverse European contexts.

The basic design of ELLs consists of five phases: first, the context within which the energy-related practices are performed is mapped. In the second phase we assess the baseline of energy use and carbon emissions as well as the practices related to energy use together with participating households. We also set a sustainability target for practice change. In the third phase, the changes in particular practices are co-designed on the basis of ideas of re-crafting practices, substituting practices, and changing how practices interlock. In the fourth phase, the context (in)dependent measures are utilised to support the actual change in practices within households. The final phase of the ELLs focuses on evaluation of the outcomes. The community elements in ELL2 (promoting community-driven efforts) are added to these basic elements included in ELL1 (targeting individual households), to scrutinize the role of elements such as peer-to-peer support and learning in living labs.

On the basis of the initial ELL designs in this document, a more detailed guidebook and an evaluation manual will be produced. This report also serves as background material for the Policy and Decision Forum (PDF).

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1 INTRODUCTION

The ways households are engaged in mundane practices that use energy vary greatly across Europe and within European countries. Similarly, the effectiveness of initiatives to save energy also vary in different contexts, and while there have been several successful European projects that have rolled out similar interventions in several countries, there is some evidence of variable outcomes depending on geographical, institutional and socio-demographic context (see Laakso & Heiskanen 2017).

ENERGISE Work Package 3 is leading the design of ENERGISE Living Labs (ELLs). The objectives of WP3 are to

- **identify interventions** that work across practice cultures and diverse energy infrastructures, considering differences in metering and billing practices, the housing stock, and socio-economic and cultural conditions in EU Member States;
- **design two types of ENERGISE Living Labs** that work across diverse energy cultures and engage various hard-to-reach households and communities;
- **select sites and target groups** for the ENERGISE Living Labs that allow for widespread and rapid upscaling of the interventions in the participating countries and beyond; and
- **define indicators of success** and related quantitative and qualitative measures, including baseline analysis, and methods for assessing rebound and spin-off effects.

WP2 systematically identifies, examines and classifies 1,000+ case studies of sustainable energy consumption initiatives from 30 European countries (EU-28, Switzerland and Norway). WP3 will translate these findings into designs for innovative, replicable and scalable Living Labs (implemented in WP4). Sustainability Assessment Toolkit (SAT) will provide guidelines for evaluation and assessment of the Living Labs, informing data collection for comparative analyses of energy-related household practices and cultures (in WP5).

The aim of this document (D3.2) is to provide background on **initial designs for ENERGISE Living Labs**. This deliverable also serves as background material for the Policy and Decision Forum (PDF), which comprises of representatives from the project team, Expert Panel and participants from policy-making organisations. The PDF reflects upon and further improves the ENERGISE policy recommendations prior to their comprehensive dissemination in Europe and internationally.

This document proceeds as follows: in Chapter 2, we define and conceptualise ENERGISE Living Labs (ELLs). We provide a brief overview on living labs as means to contribute to (especially urban) sustainability transitions, on the ways practice theory is used to guide living labs design, and on the key elements of ELLs. Chapter 3 introduces the materials and methods used in the ELL design, and Chapter 4 outlines the initial designs of ELLs. Chapter 5 discusses about the potential target groups and sites, and Chapter 6 draws the next steps of the ELL design process.

2 ENERGISE LIVING LABS

Experiences with product and service innovations show that these innovations often do not perform in the intended way in promoting sustainability. This can be either because of low user acceptance, or because of negative rebound effects that are caused by unexpected ways of using potentially sustainable innovations or by the innovations' unforeseen effects on demand (Geels & Smith 2000; Gram-Hanssen 2017; Liedtke et al. 2012). By focusing on the social practices steering consumption (e.g. Shove & Warde 2002) rather than on individual action, technological novelties or service-based solutions, alternative approaches to reducing energy demand become apparent. This chapter provides a brief overview on the concept of living laboratories, a review on living lab methodologies drawing on social practice theory and on exemplary change initiatives from WP2 database, as well as the conceptualization of ENERGISE Living Labs.

2.1 LIVING LABS IN GOVERNING (URBAN) SUSTAINABILITY

The notion of 'experimentation' has occupied a central position within the academic field that investigates transformations towards sustainable socio-technical systems. Experimentation in this sense can be defined as conducting inclusive, real-life and challenge-led initiatives, which are designed to promote system innovation through social learning under conditions of uncertainty and ambiguity (Sengers et al. 2016). Social experimentation thus widely differs from the notion of experimentation used in natural sciences: society is itself a laboratory and a variety of real-world actors commit to the experimental processes tied up with the introduction of alternative technologies, services, processes and practices in order to purposively re-shape socio-technical systems (Bulkeley et al. 2016). What is important is that experimentation is not a goal in itself, but "an instrument to explore and learn about sustainable and radically different ways of meeting societal needs" (van den Bosch 2010: 50).

Living laboratories, or living labs, although originally developed as a methodology to support ICT innovation, have proliferated as a particular form of experimentation and as a governance tool to drive sustainable (urban) development (Bulkeley et al. 2016). What separates living labs within the framework of sustainability transitions and governance from conventional living labs is that the most important success indicators are (1) **providing space for innovative (bottom-up) experimentation,** (2) **facilitating systematic monitoring and learning within a project,** as well as (3) **the envisaged use of the knowledge created** (Schliwa et al. 2015). Furthermore, it is of minor importance if a service or technology developed in a living lab turns out to be a success or not (Schliwa 2013). Living labs are not just focused on services or technologies but also on how various technologies and practices interact in the context of consumption and lifestyles, and like other forms of social experimentation, they are initiated not only by research organisations and universities, but also by communities, firms and grassroots organisations (Evans et al. 2015; Mastelic et al. 2015; Voytenko et al. 2015).

The concept of living labs can be seen as **an approach (or a methodology), an organisation, a system, an arena** (i.e. geographically or institutionally bounded space), or an **environment involving systemic innovation** (Bergvall-Kåreborn et al. 2009; Schliwa 2013; Voytenko et al. 2015). While the range of initiatives that call themselves living labs is diverse, some core characteristics distinguish them from other approaches.

Almirall et al. (2012) note that living labs are driven by two main ideas: (1) **involving users as co-creators** on equal grounds with the rest of the participants, in order to work together to frame research that delivers more effective solutions, and (2) intentional **experimentation in real-world settings** that make social and/or material alterations. In addition, Evans et al. (2015) note that living labs (3) comprise a **geographically or institutionally bounded space**, and (4) they incorporate an explicit element of iterative **learning** (Evans et al. 2015). Real-world experimentation is also (5) founded on the idea of **contingency and uncertainty** and on the need to act despite uncertainties and gaps in knowledge (Karvonen & van Heur 2014).

A widely used definition by Bergvall-Kåreborn et al. (2009) is as follows:

> *"A Living Lab is a user-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values".*

Living lab activities should be carried out in a **realistic**, **natural, real-life** setting, to understand roles, behaviour, and relationships related to the process. **'Users'** are viewed as active and competent partners and domain experts, and their involvement and influence in processes shaping society as essential. Innovations need to be based on the needs and desires of potential users, and to realise that these users often represent a heterogeneous group – what is viewed as the reality for one person does not necessarily mean the same for another person. It is thus crucial to involve a diversity of perspectives in the innovation process. **Openness** concerns supporting open mind-sets from an individual or group level to allow knowledge transfer between different levels in an organisation, as well as an overarching philosophy that is being used as the basis of how groups operate in living labs. **Value** and value creation in a living lab concerns several different aspects such as environmental, economic, business, and consumer/user value, and **sustainability** refers both to the viability of a living lab and to its responsibility to the wider community and environment in which it operates (Bergvall-Kåreborn et al. 2009).

Learning through interaction and networks is one of the key issues in living labs. Living labs disrupt existing practices by creating a temporary space where new and different (rather than conventional) rules apply. Learning relates not only to the development of technologies, services or capabilities, but also to creating joint knowledge, adapting new solutions to existing norms, regulations and infrastructures, exploring the societal and environmental impacts of new solutions, and adapting new solutions to markets and user needs, as well as to cultural meanings and identities.

Heiskanen et al. (2017) categorise learning in social experimentation into cognitive and techno-scientific learning and into situated learning focusing on tacit and affective dimensions (Table 1). Living labs can enhance broader processes of social learning for societal transitions, highlighting the role of learning as the development of new cognitive rules and the aggregation of lessons learned, as well as tacit knowledge, embodied skills and confidence obtained through learning by using, doing and interacting with e.g. new energy technologies.

Table 1. Conceptual categorisation of types of learning (Heiskanen et al. 2017).

Techno-Scientific, Cognitive Learning	Situated Learning: New Identities and Practices
Testing functionality and market demand Improving solutions in context Transfer to other sites, systematic improvement New form of societal knowledge production: What works where, when, how and why (or why not)?	Enhancing skills and confidence—new identities Reshaping roles and professional profiles Building new networks and communities Inspiration and trailblazing

In living labs, the ideas of **participation and co-creation** are central. Initially, co-creation has been understood as a process by which products, services, and experiences are developed jointly by companies and their stakeholders as well as customers (Lee et al. 2012). Nevertheless, calls to engage also the public (or lay people) as co-creators in several stages of the processes of value creation have emerged (Ramaswamy 2009) and therefore the concept and practice of co-creation has been adopted for much wider use than product or service design, such as solving complex sustainability challenges (Trencher et al. 2013), supporting social innovation for sustainability (Moulaert et al. 2013) and designing societally relevant research about global change (Mauser et al. 2013). The aim of co-creation as a participatory process is principally to bring together many different views, experiences, ideas, concerns, and – in case of such place-based co-creation as in living labs – much broader contextual knowledge about everyday practices.

Co-creation as a form of participation can bring benefits to the realisation of the living labs because a better involvement of participating households can be reached through the co-creation of activities and novel practices. A better involvement of the participants, on the other hand, enforces their positive attitudes towards the activities, which in turn increases the chances of success. Co-creation together with the participants enables a much greater understanding of the opportunities and challenges faced by the households in the realisation of the living labs. This facilitates the development of needed skills and capacities within the households, which again enhances the possibilities of successful implementation.

The living labs approach has been extended to many spheres – from Urban Living Labs and Urban Transition Labs with their emphasis on experimental urban governance (Kemp & Scholl 2016), to Home Labs that use a combination of information, technology and services to change everyday life in households (Davies & Doyle 2015; Devaney & Davies 2016; Laakso & Lettenmeier 2016). These approaches often draw on the tradition of innovation studies and socio-technical transitions.

Some of the sustainability-oriented living labs work in accordance with the transition management cycle (Bulkeley et al. 2016; Scott et al. 2012; Schliwa 2013), which indicates how living lab results can scale up into broader sustainability transitions. Transition Management (TM) is defined as a deliberative process to influence governance activities in such a way that they lead to accelerated change directed towards sustainability ambitions, and as "meta-governance" (Loorbach 2010; Loorbach & Rotmans 2010): how do we influence, coordinate, empower and bring together actors and their activities so that they reinforce each other to such an extent that they can compete with dominant actors and practices? Within the TM literature (e.g. Loorbach 2010; Rotmans & Loorbach 2009; 2010) a core notion is to "develop and manage a portfolio of experiments that is connected to a long-term sustainability vision" (van den Bosch 2010: 50). Experiments are employed to explore and learn about novel ways of change towards more sustainable systems, through carefully designed processes that include four sets of operational activities: structuring the problem and developing visions, building an agenda and creating networks, conducting experiments and projects, and monitoring and evaluating progress (Rotmans & Loorbach 2010; Figure 1).

Figure 1. Transition management cycle (Loorbach & Rotmans 2010).

Another framework for developing living labs builds on the role of niches that provide space for the development, testing and failure of novel innovations in 'real' contexts, where new networks can be supported and sustained (Strategic Niche Management or SNM, Smith & Raven 2012). These innovations struggle against stable regimes through which existing socio-technical systems are stabilised due to the processes of lock-in and path dependency. Niche experiments provide a space in which new ideas, ways of viewing the future, partnerships, socio-material configurations and so on can be trialled in a 'protected' space, affording the actors involved the potential to go beyond business as usual and prove the potential of alternatives – and eventually to either 'fit and conform' or 'stretch and reform' existing regimes (Schot & Geels 2008; Smith & Raven 2012). What is critical to living labs are thus the ways in which they constitute, and are constituted by, social networks, expectations or visions, empowerment and forms of learning co-created by research organisations, public institutions, the private sector and community actors (Bulkeley et al. 2016; Heiskanen et al. 2015).

2.2 A PRACTICE APPROACH TO LIVING LABS

There are some examples of living lab approaches employing a practice theoretical approach within households[2]. In HomeLabs conducted as part of the CONSENSUS project the challenge was to disrupt the norms associated with the intertwined household practices that shape actual moments of food consumption (Devaney & Davies 2016), water use (Davies et al. 2015), heating (Doyle 2014) and commuting (Heisserer 2014).

[2] There are also a number of other change initiatives building on a practice approach. For an overview of these, see ENERGISE D3.1 (Laakso & Heiskanen 2017).

The practice-oriented participatory (POP) back-casting procedure (Figure 2) was developed to envision sustainable futures and identify the possibilities and challenges in achieving these visions, while adopting social practices as the key unit of analysis (Davies & Doyle 2015).

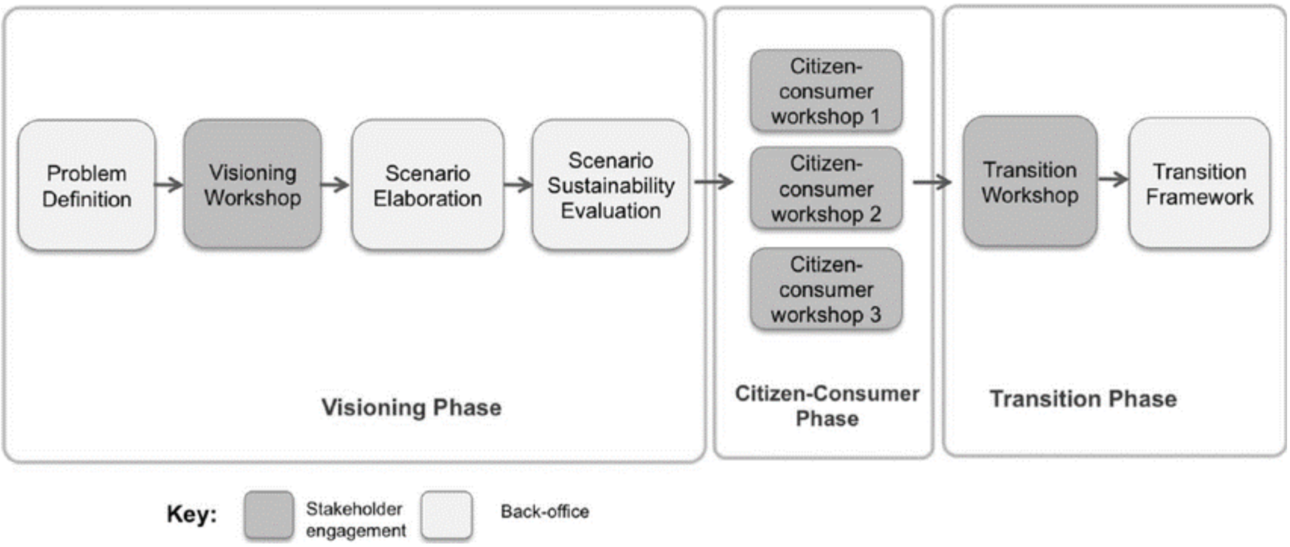

Figure 2. Practice-oriented participatory back-casting procedure (Davies & Doyle 2015).

After the visioning phase, promising practices were identified for each area of study. These considered combinations of complementary tools, skills, norms, regulations, and systems of provision (Figure 3). In the transition phase, stakeholders were invited to brainstorm interventions to build toward the future promising practices that had been identified. On the basis of this work, some ideas (on short-term interventions) were tested in the HomeLabs project that employed insights from both social practice theory and transition management (Devaney & Davies 2016). A similar approach was used in a study by Laakso and Lettenmeier (2016), although the visioning phase only included the households who also participated in the four-week testing phase, and quantification of the environmental footprints of consumption played a significant role when planning the measures to be tested.

The findings by Devaney and Davies (2016) highlight that while uniform interventions were provided to each of the participating households, the reactions to, and impacts of, those interventions varied across, and even within, households. Interventions were experienced differently as they entered novel situations with specific social relations and dynamics created by diverse household structures, life stages and familial contexts. However, they also noted that the combination of material (provision of new food items) and informational interventions (carbon graphs) were particularly influential. Another finding of Devaney and Davies (2016) was related to change agents: the researcher acted as a change agent, navigating the consumption options, supporting the identification of products and providing information to participants, but also some members of the households became important drivers of practice change in the home.

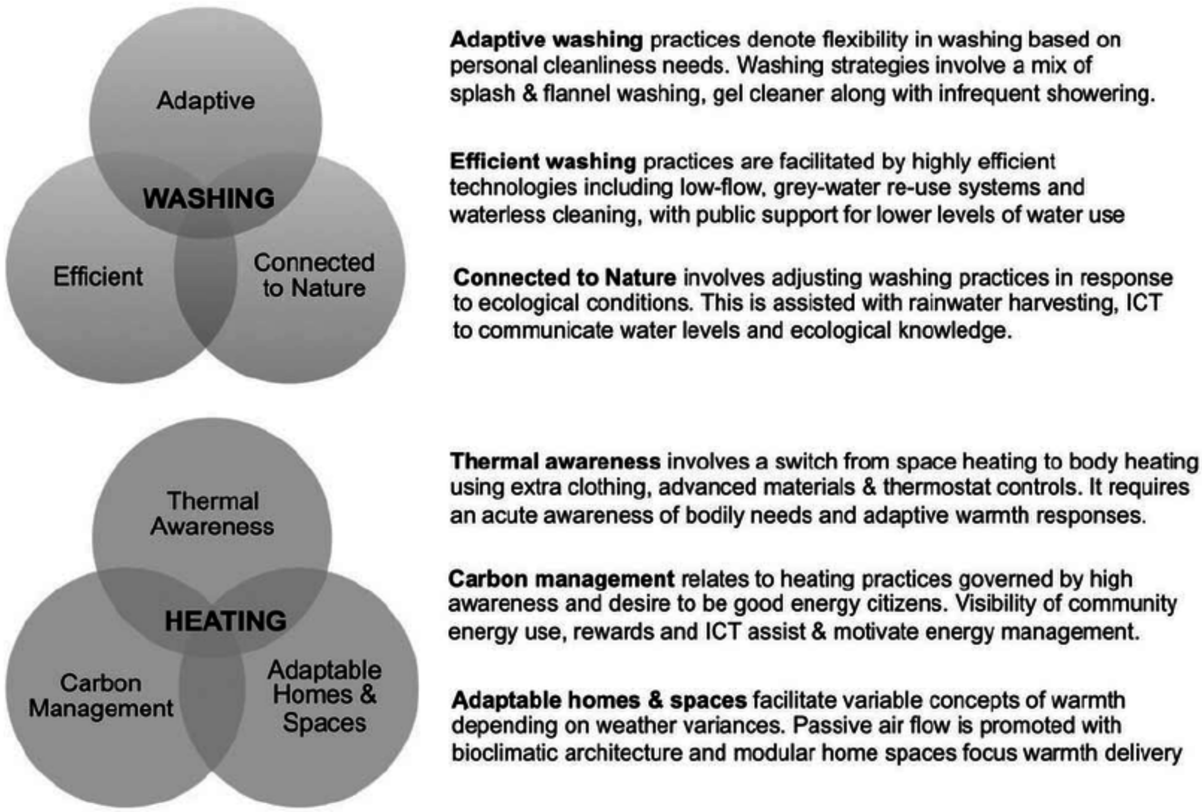

Figure 3. Examples of promising practices for heating and washing, on the basis of POP back-casting approach (Davies & Doyle 2015).

Scott et al. (2012) suggest an approach to practice-oriented experimentation that could include stages of reflection in which participants deconstruct ordinary consumption practices, and stages of experimentation in which new ideas for practice are integrated into daily life:

1. Participants **analyse the given practice** using theoretical frameworks based in practice theory. The purpose is to expose taken-for-granted elements of a practice, like norms, expectations, conventions, tastes and values. Exposing these factors means “converting barriers to change into inspirations for change” (Scott et al. 2012: 286).
2. Interventions involve **deliberate departures from standard behaviours** and can include setting goals, such as reductions in energy use. During the intervention, the measures may reveal more knowledge about barriers, requirements, or opportunities for change.
3. Insights from previous stages are translated into the **formulation of creative, new practices**. Tools, methods and conceptual support are provided for participants to make real-life implementation possible.
4. “Practice-prototypes” are **tested (i.e., performed)** in the context of people’s daily life. Participants attempt to integrate the new practice into their routines over a given period of time to see if and how they take hold or to reveal new issues. Organisers help the participants to track progress, to give them a sense of the impact of changes.
5. Organisers **evaluate** the effectiveness of the practice-prototypes in terms of chosen goals, while also acknowledging the unanticipated effects. On the basis of

outcomes, the practice-prototypes can be either deconstructed, reconstructed and further tested, or circulated among the wider public (Scott et al. 2012).

These 'guidelines' by Scott et al. (2012) have been used in practice-based experiments related to e.g. sustainable bathing and heating, or 'a shift from flowing to contained water' and 'supplementing space heating with more person oriented forms of staying warm' (Kuijer 2014). Also Borja et al. (2010) divide their (sustainable food) intervention design into three phases of (1) acquiring an overview of food system in history and at present (its place in society, behaviour around food and sustainability issues), (2) determining environmentally desirable directions for food practices, and the potential challenges and possibilities, and (3) examining actual food practices to guide designs towards practices that have a likelihood of being reproduced.

In the experiment by Kuijer (2014), a workbook first guided participants to unravel their bathing routine into separate elements, and to map how their bathing had changed during their life-time. The participants were then asked to perform less water consuming forms of bathing for a period of two weeks. Participants interacted with each other on a blog and after two weeks, participants gathered for a reflection and design session. Finally, three months after the experiment they were interviewed about possible lasting effects of their participation. Based on the outcomes of the first experiment, further interventions were conducted.

On the basis of these studies, Kuijer (2014) makes some suggestions for practice-based change initiatives. Opportunities for intervention and desirable change can be identified by combining (1) target levels of resource consumption with (2) elements from desirable (historic and contemporary) configurations and (3) tensions in the target practice. The role of the researcher is to suggest alternative practice configurations, trigger improvisation and experimentation, facilitate performances, as well as combine data of separate performances, evaluate whether the practice-prototype works, and how and whether it has desired levels of resource consumption, as well as refine the practice-prototype (Figure 4).

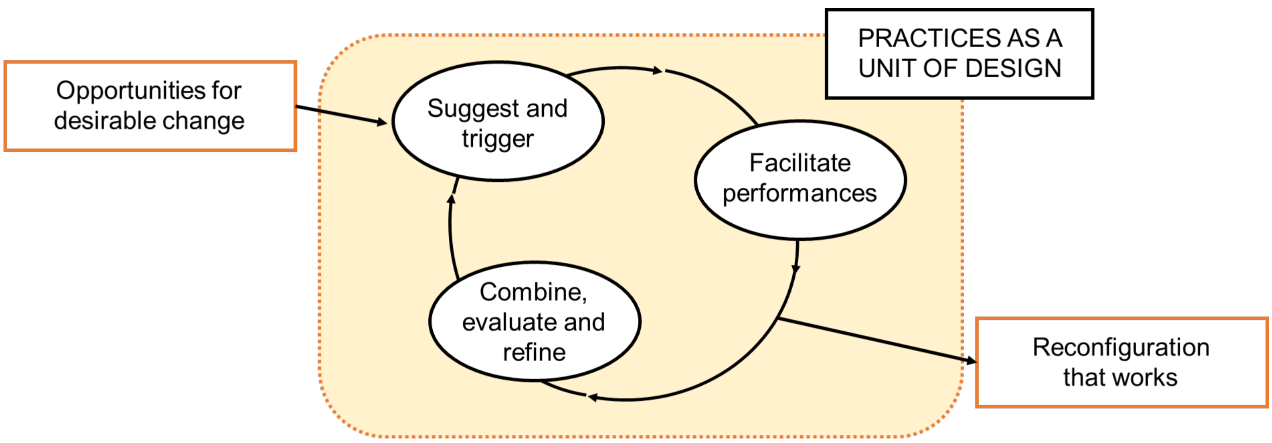

Figure 4. Illustration of practices as a unit of design (Kuijer 2014).

These insights from the previous studies on practice-based living labs present opportunities for the ELL design but also pose some challenges, especially related to the resource intensity, cost and time of these kinds of Home Lab interventions. It is also critical to engage all members of the household, but also a variety of other actors, to release the wider potential to disrupt unsustainable household consumption practices in different settings (Devaney & Davies 2016). This is also related to the distinction between practice-as-performance and practice-as-entity (see Kuijer 2014): to change practice-as-entity, the reconfiguration needs to recruit more and more individuals as carriers, and thus the focus of living labs should not be only in changing practices within a household, but in revealing and challenging the underlying social norms, rules and cultural conventions and focusing on the mainstreaming potential of more sustainable practices.

2.3 EXEMPLARY CHANGE INITIATIVES FROM THE WP2 DATABASE

Although there are still relatively few practice-based living labs from which to draw experience, the ENERGISE WP2 database (Jensen et al. 2017) includes some sustainable energy change initiatives that offer inspiration for designing an ELL that takes into account several aspects of practice, engages households and communities as active participants and addresses sufficiency rather than merely efficiency (Table 2).

Table 2. Exemplary change initiatives from the WP2 database, in alphabetical order.

Name and location	Brief description
Cardedeu en Transició (Cardedeu in Transition), Barcelona, Spain	Transition town initiative with workshops, interactive chats, environmental movie screenings, presentations, free fruit picking and community gardening
Conversas com Ambiente & EcoFamílias da Póvoa (conversations with the environment and EcoFamilies), Póvoa, Portugal	Awareness raising among local residents of Povoa through a series of events, smaller group of families visited and engaged to test behavioral and technical measures to decrease energy use
Energiesuffizienz (Energy sufficiency), Germany	"Neighbourhood Labs" with the researchers also with in-depth studies of 12 households and co-creation of suggestions for alternative practice
Future Household, Jyväskylä, Finland	Home Lab with 5 households. On the basis of carbon and material footprinting, households selected measures (in e.g. food, mobility) to test during a four-week experiment
KlimaAlltag – Leben in der NullEmissionsStradt (Life in the zero-emissions city), Cologne and other cities, Germany	Among other measures, field tests with 80 "climate households" from different socioeconomic groups committed to voluntarily reduce their CO_2 emissions through changes in everyday routines
Klimafamilier (Climate families), Ballerup, Denmark	20 households experimented with changes in lifestyles/practices in several domains, with active co-design
Observatoire de l'énergie (Energy Observatory), Geneva, Switzerland	Bring community members toward 2000-watt society through energy ambassadors, collective activities, education, energy hotline and energy calculator

These initiatives have different foci and strengths (Table 3). Some are innovative mainly in terms of contextualization within a wider, bottom-up change initiative (the cases from Cardadeu and Póvoa). In the case of ELL design, this can have implications for where to locate ELLs so that they communicate with and gain meaning from other initiatives, which can be important for recruitment of participants and stakeholders and for the scaling up of lessons learned. Indeed, the initiatives have involved various stakeholders (local government agencies, service providers, NGOs and citizen groups) which have had important roles in both supporting the change processes and in diffusing results into wider society.

The other cases have more distinct Home Lab features. The Energiesuffizienz (Energy sufficiency) initiative from Germany stopped short of actually testing practices, but it illustrates some practical approaches to operationalizing sufficiency in a mixed-participant Home Lab context, where perhaps there is less time, space and commitment by participants for ideological critique of consumption than in long-term bottom-up initiatives. It also demonstrates a research approach for assessing the acceptability of sufficiency-based solutions and a co-design session for designing products and services that promote energy sufficiency.

Table 3. Exemplary aspects in the selected cases

Name and location	Exemplary features
Cardedeu en Transició (Cardedeu in Transition), Barcelona, Spain	Anchoring in local community, conversations events Bottom-up projects initiated by residents
Conversas com Ambiente & EcoFamílias da Póvoa (Conversations with the environment and EcoFamilies), Povoa, Portugal	Anchoring in local community, conversations events Home visits, mapping of habits and energy use, assessment of savings potential
Energiesuffizienz (Energy sufficiency), Germany	Practical operationalization of sufficiency: reduction of use of devices, substitution of home devices by urban services or delivery of utility Careful research on energy sufficiency practices and their acceptability Open innovation workshop with concept design of appliances to promote sufficiency
Future Household, Jyväskylä, Finland	Ambitious targets of sustainable footprint levels Vision development on the basis of carbon and material footprints Barriers to change were explored in workshops Sharing of experiences via social and local media Simple robust methods for assessing CO_2 impacts at different stages Existing analysis from a practice perspective
KlimaAlltag – Leben in der NullEmissionsStradt (Life in the zero-emissions city), Cologne and other cities, Germany	Ambitious goal of 25% reduction in CO_2 emissions Focus on routines Diversity of participating households, not only ecologically oriented ones Financial reward (promoting diversity) Continual support by climate advisors Detailed research to identify lessons for scaling up
Klimafamilier (Climate families), Ballerup, Denmark	Ambitious goal of 26% reduction in CO_2 emissions Focus on practices Diversity of participating households Co-design by households (partly successful) Practical and technical support Lessons about the importance of a shared understanding
Observatoire de l’énergie (Energy Observatory), Geneva, Switzerland	Location in Minergie buildings to address social dimensions in a context where technical measures have been taken Community aspects Several interesting measures envisaged (energy ambassadors, challenges to question conventions of normality)

Future Household, KlimaAlltag and Klimafamilier are Home Lab designs, where a group of households trial new routines or practices in their everyday life. They all involve some technical and/or infrastructural support (e.g. advisors, meters, cargo bicycles, free bus tickets), but also engage households in conversations about how and why practices could change. In the KlimaAlltag example, this is done with households individually, using interviews and questionnaires, as well as support from climate advisors. The Future Household and Klimafamilier are examples of community-based initiatives, where households collectively reflect and have a greater role in co-design. On the other hand, KlimaAlltag and Klimafamilier were long-term change initiatives, whereas Future

Households demonstrates a more time-limited approach to testing changes in everyday practices. Investigating the timelines and implementation steps of these examples has been very useful, and the basic steps of these have been incorporated in the ELL design.

There are also good examples of how to integrate research, monitoring and sustainability assessment into ELLs. The German cases include systematic and comprehensive approaches to research in order to address the acceptability and scalability of changes in practices. On the other hand, the Future Household project has demonstrated a similar approach to investigating CO_2 impacts of practices and their changes, and the impacts of the project have been evaluated from a practice perspective (Laakso 2017). Perhaps what is missing is an analysis of how practice-based sustainable energy change initiatives influence wider conventions and expectations of normality, which may emerge from the research conducted in the Energy Observatory project.

Most of the available information concerning the examples focuses on successful aspects of these initiatives. There is also much to learn from honest accounts of things that did not go exactly according to plan. The Klimafamilier case, a very ambitious project which actually met many of its goals, also highlights some of the problems that organisers might encounter. These were due to limited shared understanding concerning the aims of the initiative, as well as to lack of clarity about the roles of different parties, and to limited communication between the experiment and the wider community where it was embedded.

2.4 THE CONCEPT OF ENERGISE LIVING LABS

Moving beyond much conventional sustainable energy consumption research, ENERGISE explicitly recognises the centrality of wider practice cultures, considering meanings, competences and material conditions as well as the wider societal conditions in which they are embedded (Rau & Grealis 2017). The interest is in prevailing energy cultures – sociocultural factors that shape domestic energy use and create variations in how energy is generated, distributed, viewed, and used both within and between countries (Rau & Grealis 2017). ENERGISE sees a change in these cultures as a key ingredient of successful energy sustainability transitions.

ENERGISE adopts the living lab methodology in order to test novel ways to perform everyday practices together with the households in their real-life surroundings. ENERGISE Living Labs (ELLs) are **targeted initiatives to transform energy use in households and communities** that address

- individual-level, organisational, institutional and societal (i.e., contextual) influences on household energy-related practices,
- the relationship between routines and ruptures in shaping energy cultures,
- the prevention of rebound and ‘backfire’ effects in initiatives, and

- policy options for changing the quality and quantity of energy use[3] through individual-level and community-based initiatives to shift unsustainable energy cultures.

In addition, ELLs will incorporate

- good practice **measures that are relatively context-independent** and that are expected to work (more or less) across European energy cultures, and
- **highly context-dependent measures** for modifying energy use that are likely to work differently in diverse European contexts.

The main aim of ELLs is to promote sustainable energy use while acknowledging the context-dependence of the change initiatives. To ensure wide cross-European and practical applicability of the ELLs, **input from experts** from relevant scientific and non-scientific organisations complements the academic and practical experience of the ENERGISE consortium partners (see Chapter 3). ELLs act as tools for cross-national data collection and energy reduction action across cultural contexts (WP5). The ELLs also aim to design and test promising solutions for developing common, or at least harmonised measures for improving the implementation of sustainable energy policies across Europe. The translation of results into recommendations for future EU energy policy and research (in WP6) will provide decision makers with insights and high-quality data required to advance the Energy Union. In the following, some key concepts of ENERGISE Living Labs are introduced.

2.4.1 PRACTICES AS A STARTING POINT

The starting point for the design of ELLs is the ENERGISE conceptual framework (WP1) that approaches **energy use as a material expression of people's performance of everyday practices and associated cultural conventions** (Rau & Grealis 2017). While practices have directly observable aspects that are often at the focus of research, their tacit or hidden elements can be equally (if not more) important, and the challenging task is to uncover and incorporate into analysis these hidden parts of practices, as well as the socio-cultural factors that shape collective energy demand (Rau & Grealis 201; Shove & Warde 2002). Although **the relevance of context**[4] in promoting sustainable energy use is widely acknowledged (Breukers et al. 2011; Heiskanen et al. 2013), there is limited empirical research documenting how (and how much) the effectiveness of change initiatives depends on context.

Building on the database and the typologies of sustainable energy consumption initiatives (developed in WP2), as well as prior research on reasons for variations in several energy-related practices and on the influence of **material, institutional, social and organisational aspects** of the effectiveness of energy saving interventions, we have

[3] By quantity, we mean achieving reductions in energy use, whereas by quality, we refer to e.g. environmental and social sustainability of energy use (i.e. use of renewable energy sources and tackling energy poverty).

[4] By context, we mean not only spatial, geographical or institutional locations (such as particular countries or towns) but also the prior sets of social rules, norms, values and sets of social relationships pre-existing the introduction of the intervention (Pawson & Tilley 1997). Further, the relation between change initiatives and contexts is complex and emergent (Dahler-Larsen 2001).

identified aspects that most likely are cross-culturally appropriate in terms of changing domestic practices related to energy use, as well as aspects of change initiatives that are likely to be highly context-dependent, making them very effective in their respective locations but also hampering their successful transfer across cultural or national boundaries (Laakso & Heiskanen 2017). In addition, the design of ELLs will benefit from previous experience on practice-based living labs (see Chapter 2.2). These findings have delivered essential information and criteria for identifying the most relevant approaches, with a view to maximising ecological validity, relevance, applicability and upscaling potential of the ELLs.

A practice approach also enables focus on the relationship between **routines and ruptures** in energy use, as disruptions in particular elements of practices are one opportunity to change practices as daily routines. The role of ruptures, or “moments of change”, has been investigated in several consumption domains and habit disruptions have been found to provide an important “window of opportunity” to change behaviour, but the extent of such change is likely to be limited without adjustments to the cultural and structural factors (see Laakso & Heiskanen 2017).

2.4.2 CO-CREATION WITH HOUSEHOLDS AND COMMUNITIES

ENERGISE incorporates two types of initiatives – one that targets **individual households** (ELL1) and one that promotes **community-driven efforts** (ELL2). ELL1 features a suite of measures intended to appeal to individual households to change their energy use, thereby reducing the total energy consumption of their household. ELL2 adds to the ELL1 design a set of measures intended to reduce household energy consumption through shared activities at the community level. As the focus is on practices, the ELLs **target practices together with participating households**, rather than target households and their values, knowledge or behaviours. The activities in the ELLs are planned in close cooperation with the participating households and communities, following a basic design that is the same for all ELLs (see Chapter 4). This makes participating households and other stakeholders co-creators of novel practices, delivering more sustainable solutions while learning about practice cultures (cf. Almirall et al. 2015; Evans et al. 2015). The ELL2s are especially appropriate for co-creation activities, as they naturally offer a plethora of views on household practices and energy consumption, making the community activities more beneficial for co-construction of knowledge. Co-creation is nevertheless also possible in the interactions with the individual households, although these situations tend to involve fewer participants.

The ELLs incorporate 320+ households across eight countries in Europe (CH, DE, DK, FI, HU, IE, NL, and UK). The ELLs are conducted within households of different sizes, contrasting dominant models of individual- and national-level consumption research. **Participating households** are selected according to a set of criterion such as size, location (rural/urban[5]), income, gender and other factors, based on extensive deliberation within the consortium (see Chapter 3). While not statistically representative, the resulting

[5] The definition used by Eurostat builds on a two-step approach to identify population in urban areas: (1) a population density threshold (300 inhabitants per km²) applied to grid cells of 1 km² and (2) a minimum size threshold (5,000 inhabitants) applied to grouped grid cells above the density threshold. The population living in rural areas is the population living outside the urban areas identified through the method described above. See http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology

samples are highly relevant given the national-level composition of households within each country. However, the most important selection criteria is that the households selected provide the opportunity to study the relevant, energy-related practices (i.e. the households need to be engaged in these practices). Unlike in many previous living labs, one of the aims of ELLs is to also involve **hard-to-reach** households, i.e., households who are difficult to involve in an active participatory citizenship process[6]. In the context of ENERGISE, 'hard-to-reach' households are defined as households who are lacking the means, tools and/or reasons to save energy.

Social norms (unspoken rules of behaviour that are considered to be acceptable in the society or in the community) are closely connected to other elements of local practice cultures. They, therefore, have a very strong guiding function in the practices and lifestyles of people and changing them is difficult. Communities are better placed to challenge social norms than individual households. Social norms pertain to people's expectations toward one another (Opp 2001). Hence, questioning of social norms benefits from a collective deliberation, and altering social norms is only possible in a social context. Community engagement initiatives challenging social norms related to energy use in ELL2 may enable the creation of new practices-as-entities that could replace a previous practice and become a new social norm, if the whole community tests and accepts it. Communities can challenge existing conventions and also gradually create new ones (Shove et al. 2012).

Engaging **communities** can also serve to overcome the following interlinked limitations of addressing merely individuals and households (Heiskanen et al. 2009):

- *Socially shared competence*: Energy consuming practices are learned socially, by engaging in social practices such as shopping, preparing meals or furnishing a home, rather than via complex calculations of individual preferences and budgets. If living labs are to create new knowledge concerning energy consumption, it should be embedded in everyday social situations for it to gain relevance for everyday practice.
- *Collective conventions*: Notions of what is appropriate are learned socially, and they are also maintained and evolve through social interaction. Conventions are an essential part of the social order, and they make social interaction effortless and predictable. It is difficult for individuals to step outside conventional systems of consumption, or even to perceive the conventional (i.e., socially agreed) nature of customs that have become self-evident and normal. Hence, individuals are usually not keen to challenge shared conventions, e.g. concerning how to dress, how clean one should be, or what food to offer guests, unless they are supported by their community.
- *Shared infrastructures*: The evolution of consumption patterns, conventions and customs is closely linked to the development of technologies of everyday life, which are place-bound and often governed by local authorities (e.g. municipalities). Even though conventions and socio-technical systems are two sides of the same coin, it is worth addressing infrastructures separately as their materiality requires specific resources for change.
- *Social dilemmas*: Because everyday life is strongly routinised and shaped by collective competence, conventions and infrastructures, change is often effortful and risky. If the argument for change is societal (e.g. sustainability), individuals should have some assurance that other members of society (or at least their local community) will participate, as well.

[6] See also Defining 'Hard to Reach Groups', https://bemis.org.uk/project/hard-to-reach-learners-and-youth-european-focus-group/

Communities are usually divided into communities of place and communities of interest. Brint (2002) has developed a more elaborate typology, where there can be several combinations of spatial concentration and reasons for interaction (Table 4). Activity-based communities can be communities of practice, focused on particular activities, like gardening or biking. Yet belief-based communities are also likely to share some common practices, as in the case of communes, where beliefs and practices are closely intertwined. But communities can also share practices in the case of interest-based associations, like jobless associations, which organise times and places for members to associate, share meals, read newspapers and do informal work.

Table 4. Typology of communities (simplified from Brint 2002).

Essential basis of relationship	Primary reason for interaction	Frequency of interaction	Example
Geographic	Activity based	Relatively frequent	Neighbourhood groups
		Relatively infrequent	Local friendship networks
	Belief based	Relatively frequent	Communes, collectives
		Relatively infrequent	Local friendship networks
Choice/interest	Activity based	Concentrated in space	Elective activity-based communities
		Dispersed in space	Virtual communities
	Belief based	Concentrated in space	Elective sub-cultural communities
		Dispersed in space	Imagined communities

Communities are defined in ENERGISE as a group of individuals that share a place, worldview and/or particular interest. The community can involve face-to-face exchanges and/or virtual communication between group members. A community of practice is here defined as a group of people whose members either deliberately or unintentionally participate in the same practice and who may or may not be situated in the same geographical context (e.g. professionals in the same organisation, online community)[7].

Usually, living labs are located in a certain geographical location and hence anchored in some kind of community of place. In the case of household energy consumption, there is a case to be made for geographical communities of co-located households. This is primarily because several infrastructures are shared by geographic communities. This is most obvious for transport infrastructures (cycle lanes, public transport). Additionally, geographic patterns of the built environment also result in geographically concentrated ways of home heating and similar opportunities for conserving energy across Europe (Balta-Ozkan 2015; Balta-Ozkan & Gallo 2017). In the case of multi-unit dwellings, many infrastructures for heating are very concretely shared, and changes in their use might require coordination or collaboration (Matschoss et al. 2013). Moreover, local stakeholders like schools, retailers, technicians, energy grid operators and local authorities can be important sources of information and support (or hindrance) for changing energy related practices (Heiskanen et al. 2013). From this perspective, *neighbourhood groups* or the like might be ideal for living labs.

[7] This definition differs from the more well-known definition of Communities of Practice (CoP) by e.g. Wenger (1998), where CoPs are defined as groups of people who share a concern for something they do and learn how to do it better as they interact regularly. The CoP definition does not necessarily imply deliberate learning, but it does imply a joint enterprise, mutual engagement, and shared capabilities and sensibilities, which might not be the case for people unintentionally taking part in a common social practice.

From the perspective of living lab design, communities of choice (i.e., interest) might offer opportunities for like-minded households to actively discuss and reshape household practices, as is the case for example in GAP groups (Hobson 2003). Such communities might also be (and often are) concentrated in space, though location is not the primary reason for belonging to the community. *Elective activity-based communities,* such as local cycling associations might offer an opportunity to combine shared interests (not necessarily environmental interests) and existing networks with a certain level of spatial concentration, whereas *elective subcultural communities,* such as local religious associations might offer opportunities to engage new and different participants in living labs, which have often targeted well-to-do and educated people. However, there may be challenges in combining the involvement of such communities with the socio-demographic and socio-material requirements for ELL participants (see Chapter 5).

2.4.3 ACKNOWLEDGING REBOUND, BACKFIRE AND SPIN-OFF EFFECTS

A focus on household practices is expected to enable the ELL design to better take into account various kinds of unplanned effects of energy interventions. These include rebound, backfire and spin-off effects. This section first provides conventional definitions for these different kinds of unplanned side-effects of interventions and then examines them from a practice-based perspective.

The rebound effect is usually discussed from an economics perspective (Jalas 2002; Hertwich 2005; Sorrell and Dimitropolous 2008), where it is conventionally divided into: (1) *direct rebound effects*, where the reduced price for an energy service (e.g. lower cost of lighting via the introduction of LED bulbs) can lead to increased consumption of that same service (lights are left on more carelessly or people gain more illumination by purchasing more light fixtures), (2) *indirect rebound effects*, where the reduced price for an energy service (e.g. lighting) results in financial savings for the consumer, which are then used to increase service levels in some other area. This other area might perhaps be more or less energy intensive (long-distance air travel vs. education) and (3) *economy-wide and transformational effects*, where greater energy efficiency reduces the prices of goods throughout the economy, e.g. reduced demand of fuels lowers prices leading to greater demand in other sectors, or enhanced efficiency enables new services such as long-distance travel which were previously not available. Galvin and Gubernat (2016) have linked this to a social practice approach, highlighting how greater energy efficiency (coupled with other efficiencies, such as cost) can lead to changes in social practice and arrangements, such as an “arm’s race” in getting the newest ICT systems. Shove (2017) has recently discussed a further type of rebound, which could perhaps be termed symbolic, in how the concept of energy efficiency stabilizes current notions of service levels and distracts attention from “doing things differently” or “not doing them at all”.

Direct rebound effects can be measured in terms of household energy use, and are usually in the order of 10-30%, but assessing the indirect and economy-wide rebound effects usually requires the use of general equilibrium models (Sorrell and Dimitropolous 2008). Transformational effects are usually investigated in the history of technology (e.g. Geels and Smit 2000). **The backfire effect** is a special case of the rebound effect, where increased energy efficiency is assumed to actually lead to greater energy consumption, i.e., to cancel out more than 100% of all savings (van den Bergh 2011)[8].

Spin-off (or spillover) effects are effects where savings in one area can induce savings in another (Hertwich 2005). These can be behavioural changes (e.g. learning to save energy at work spills over to saving energy at home) or technical changes (e.g. low-energy appliances allowing for off-grid energy solutions). In energy efficiency programmes, impacts on people other than the addressees of the programme are also considered spillover effects. Such effects are difficult to investigate with purely economic models, but a practice approach offers promise to explore the positive side-effects of energy saving programmes.

A practice approach allows us to zoom in on the processes that cause rebounds at the household level. For example Gram-Hanssen et al. (2012) and Winther and Wilhite (2015) investigated the rebound effects from the adoption of heat pumps in households. Winther and Wilhite (2015) identified a temporal rebound effect (heating was used for longer periods of time because it was more convenient and cheaper), a spatial rebound effect (more rooms were heated) and a multipurpose rebound (new and unexpected functionalities such as drying clothes near the indoor unit of the heat pump[9]). Gram-Hanssen et al. (2012) identified similar categories of rebound. However, they also measured the energy use of the households. As a result of the rebound effects, the heat pumps did not save as much energy as promised: an estimated 20% of the savings were taken back in the form of increased comfort. The implications for ELL design are that there is a need to attend to the spatial and temporal aspects of energy use in household practices, as well as the interconnections between practices, in order to assess rebound effects.

Jalas (2002; 2009) has elaborated on a time-use or household activity rebound which has close connections with household practices. He has investigated the impacts of various activities and their replacement with other activities (e.g. shopping with home deliveries) from the perspective of time use. For example, commercial laundry services may be more resource efficient, but their net effect depends on the new activities the consumer engages in due to the additional leisure time gained. Jalas (2002) has proposed using the average energy intensities of activities, based on a combination of time-use data and input-output data, to investigate the impacts of changes such as the replacement of home laundering or home cooking with commercial services. In this way, one could make observations of

[8] This is usually discussed in the context of economy-wide effects rather than at the individual household level – and it is also contested (Sorrel et al. 2008). Until now, advances in energy efficiency have been largely cancelled out by increased levels of consumption, but it is not obvious that this growth is merely due to energy efficiency. Moreover, in the past decades, energy consumption has stabilised in Europe (Sebi & Lapillone 2017). It is difficult to imagine how energy efficiency could be credited or blamed for all economic growth. First, energy is just one of the production factors (i.e., labour, materials, land and capital). Second, the role of efficiency in economic growth is highly debated. Economic growth according to the current mainstream understanding (Romer 1990) is driven by technological development that creates new "needs" and markets that did not exist before (like communicating with people on other continents). This suggests that rather than investigating rebound effects as such, attention should be devoted to the transformational effects of new technological solutions. Living labs, indeed, often aim to develop a range of new technologies, which in turn can create new needs for, e.g. communication and thus cancel out some or all of the efficiency gains.

[9] Using the heat pump for cooling could also be categorised in this category (see Gram-Hanssen et al. 2012).

changes in time used for various practices in the ELLs and quantify their impacts using average energy intensities of various activities.

The implications for the ELLs are as follows. The ELLs aim to capture issues of rebound and spin-off in household energy related practices. This can be done by close investigation of the practices that change and their interconnection with other practices (e.g. competition for time, interlocked changes, use of space). For example, greater energy efficiency in heating might change the way residents use various rooms in their homes, resulting in changes in other practices and how they link to each other (Kuijer & Watson 2017). Moreover, we can attempt to estimate what broader new social arrangements and practices (Galvin & Gubernat 2016) might be created through the introduction of new technologies and how the introduction of new practices influences expectations and standards of normality (cf. Shove 2017), albeit such analyses might be difficult on the household level.

2.4.4 SUSTAINABILITY ASSESSMENT TOOLKIT (SAT)

ENERGISE will closely and systematically **monitor and compare the sustainability outcomes** of ELLs by developing, testing and refining a Sustainability Assessment Toolkit (SAT[10]) that focuses on (1) total energy use in the participating households, also including identification of rebound, backfire and spin-off effects, (2) other relevant indicators of social, economic and environmental sustainability, (3) socio-demographic influences on energy use, and (4) levels of social acceptability of the two types of ELLs and their individual elements (see Chapter 4.5).

2.4.5 SUMMARY – KEY FEATURES OF ELLs

To conclude, the process guiding the design of ENERGISE Living Labs can be summarised in seven key features.

Designing ENERGISE Living Labs – Seven Key Features

1. Select intervention and engagement methods that are applicable in diverse practice cultures.
2. Combine co-creation, intervention and engagement methods in effective ways.
3. Engage academics, (local) stakeholders and practitioners in the development of the ELL, with a view to effectively incorporating existing knowledge and lessons learned and to building up a user community for upscaling the ENERGISE results.
4. Focus on routines and ruptures, as well as the potential rebound, backfire and spin-off effects of practice change
5. Involve hard-to-reach households and households representing the national-level composition within each country.
6. Select ELL sites and target groups to allow for widespread and rapid upscaling in the participating countries and beyond.
7. Develop easily usable tools and manuals for ELL design, evaluation and public engagement across practice cultures and ensure their widespread dissemination.

[10] SAT is an easy-to-use ELL evaluation and assessment manual. The evaluation and assessment guidelines in SAT will be implemented in ENERGISE online monitoring platform (in WP4).

3 MATERIALS AND METHODS USED IN DESIGNING ENERGISE LIVING LABS

The methods used to identify suitable ELL designs, as well as the potential target groups and sites, went hand in hand with the methods used to capture cross-cultural good practices (see Laakso & Heiskanen 2017). Data was collected during 2017 from each consortium partner as well as from local expert practitioners and the members of ENERGISE Expert Panel. This engagement involved interviews with experienced practitioners working in each of the eight countries by each ENERGISE consortium partner on change initiatives that might (not) work in particular contexts and for particular target groups (n= 40), as well as a workshop on the key aspects of cross-culturally applicable interventions, for both ENERGISE consortium members (n= 19) and members of an expert panel including experienced practitioners and policy makers (n= 6)[11].

The material used in identification of ELL designs includes two assignments to each consortium partner. In the first assignment (that was sent to partners in March 2017), partners were asked to identify and describe hard-to-reach and prioritised groups for their country, in order to ensure that selected change initiatives would be examined in the broadest possible set of household circumstances. In addition, while collecting data for ENERGISE WP2 on case studies of relevant change initiatives related to energy, partners were also asked to identify three existing cases that they would expect might work in their country for their target group, as well as three cases they expected might not work in this context, and explain why. This rendered a selection of initiatives (or types of initiatives) that were considered likely to work in several contexts, and justifications for these choices. Partners were also asked to collect feedback from at least three expert practitioners in their country on their selection and justifications.

On the basis of this assignment, five compound stories (i.e., basic categories of interventions, their basic assumptions, mechanisms and constraints) that would work in different contexts were created, as well as four intervention categories that would not work in a particular context. These categories were then subjected to discussion, validation and further elaboration by the ENERGISE Expert Panel and consortium partners in a workshop hosted by the National University of Ireland, Galway (NUIG) in Dublin, in June 2017. During the workshop, participants also discussed the potential target groups for each intervention deemed suitable across different contexts (for more details, see Laakso & Heiskanen 2017).

The second assignment was sent to ENERGISE partners after the Dublin workshop in June 2017 (see Appendix 1). In this assignment, partners were asked to further reflect on the initial categories of initiatives and specify stakeholders and potential partners they would (and would not) like to collaborate with. They were also asked to consider how well their preferred intervention measures and design elements would address hard-to-reach

[11] This data has been used for the initial design of ELLs presented in this document. However, the detailed ELL design is an on-going process and we are going to complement the data presented here with (at least) the output from (1) the second workshop, to be organised in December 2017 in Helsinki by the University of Helsinki, piloting and elaborating key aspects of the ELL designs, as well as (2) the results from the analysis of sustainable energy consumption initiatives in WP2 and (3) an online consultation for the preliminary ELL design by Expert Panel members.

and prioritised groups, and how well these measures might work in other ELL countries. In addition to written assignments, the ENERGISE partners' thoughts about the initial designs and potential target groups and sites have been discussed in monthly meetings and a separate calls in September and October 2017.

The data presented above has been complemented with previous studies on interventions and living labs building on a practice approach, as well as findings of D3.1 (Laakso & Heiskanen 2017). The initial design of ELLs has been developed in a close collaboration with WP4 that comprises the preparation, roll-out and monitoring of ELLs, and with WP5 leading the cross-national analysis and comparison of ELLs, as well as the consortium partners who will be implementing the ELLs in their countries in 2018.

4 INITIAL ENERGISE LIVING LAB DESIGNS

The ENERGISE Living Labs aim to employ practice-based approaches to reduce energy use in households while paying attention to why energy-intensive practices are performed and how they depend on the context in which they are performed. The design of the two living labs, ELL1 (targeting individual households) and ELL2 (promoting community-driven efforts) is based on practice-based living labs and other sustainable energy consumption initiatives reviewed in Chapter 2, as well as on the ENERGISE conceptual framework (Rau & Grealis 2017) and the work done in WP3 thus far. The outline of the design is presented in Figure 5.

The basic design of ELLs consists of five phases: ELLs start with the definition of the contextual aspects underlying practices. In the mapping phase, we assess the baseline of energy use and carbon emissions as well as the practices related to energy use together with participating households. We also set a target for practice change, on the basis of the households' needs, motivations, concerns and expectations. In the measures phase, the changes (of elements) in particular practices are co-designed on the basis of ideas of re-crafting practices, substituting practices, and changing how practices interlock (see Spurling et al. 2013). In the testing phase, the best practices for sustainable energy initiatives identified in D3.1 (Laakso & Heiskanen 2017) are utilised as the households try to change their daily practices. The final phase of the ELLs focuses on evaluation of the outcomes. The community elements in ELL2 are added to these basic elements included in ELL1[12].

By following these specific phases, each one working as output for the following phases, the design follows the principles of transition management cycle that has been employed also in some previous living labs (e.g. Devaney & Davies 2016; Laakso & Lettenmeier 2016): from problem structuring to developing a portfolio of potential solutions, testing them and monitoring and evaluating with the aim to learn and scale up the lessons. However, the ELL design also recognises the central role of local practice cultures as niches from which the wider change can emerge, and thus the need to support experimenting with and learning about alternative practice configurations within these niches (see also Heiskanen et al. 2015).

[12] This document outlines the initial design of ELLs. More detailed description and practical guidelines will be provided in D3.4 (Easy-to-use ENERGISE Living Lab intervention and engagement guidebook).

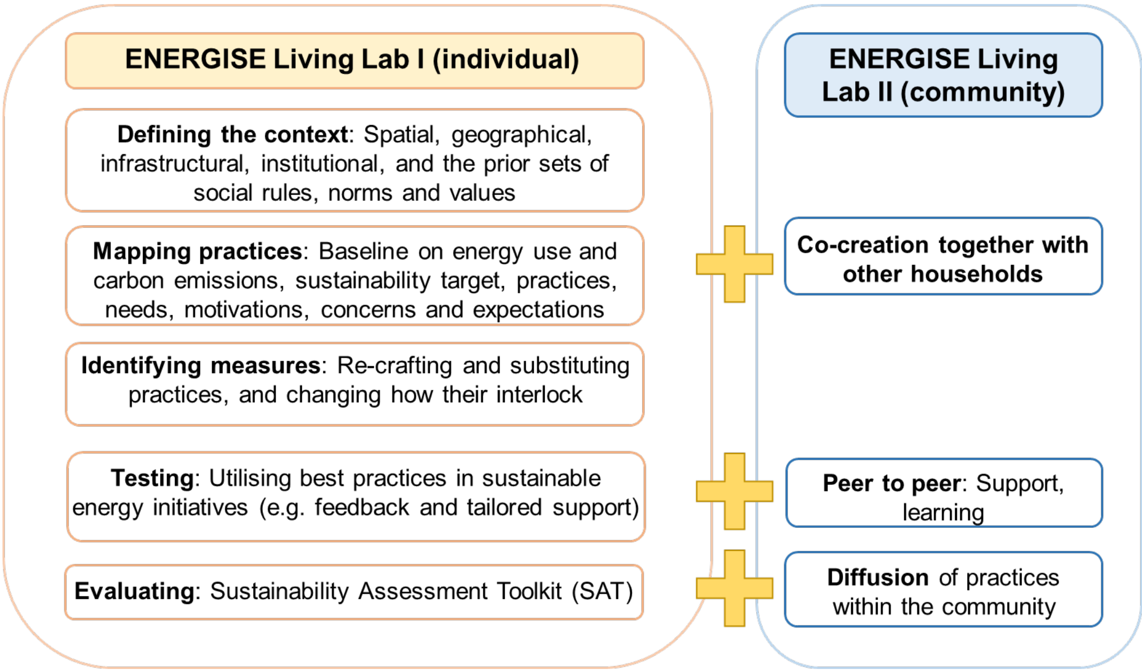

Figure 5. Basic design of two ENERGISE Living Labs.

The first three phases of ELLs (defining context, mapping practices and identifying measures) happen before the "active" phase of testing that lasts altogether eight weeks. These phases can happen over a longer period, recognising that they might be laborious for both participating households as well as the researchers responsible for implementation. After these "preparatory" phases, each set of one or two practices is tested within a period of eight weeks, either in parallel or one set after the other (Figure 6). The testing phase starts with a kick-off meeting. In the halfway point of the testing phase, the researchers discuss with the households and some further support may be provided if needed. If the households face some difficulties, these and the reasons behind the obstacles are discussed and some alternative practice configurations may be tested. This halfway point also serves as a point for introducing the community elements in ELL2. Testing phase ends with a final meeting followed by evaluation and follow-up activities. As the participants attempt to integrate the new practice into their routines to see if and how they take hold or to reveal new issues, it is important to track this progress by monitoring activities throughout the ELL, to observe the interconnections and potential rebound or other effects due to the changes (see also Scott et al. 2012).

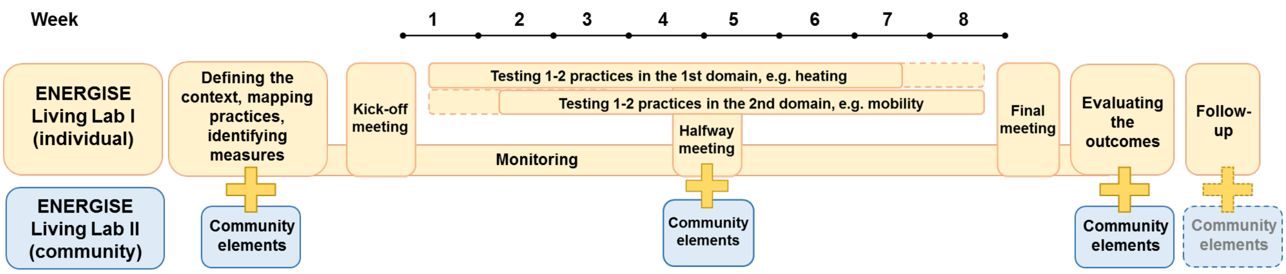

Figure 6. Initial timeline of the ELLs.

In the following section the phases included in ELL1 design as well as the community elements added in ELL2 are discussed in more detail.

4.1 DEFINING THE CONTEXT

To understand the configuration of practices, we need to understand contextual aspects such as differences in cooling or heating systems (or needs for these systems, or opportunity to pay for these systems) and in the provision of public transportation services, as well as the ways in which housing associations are organised and the presence of local (or national) energy policies. ELLs thus start with a fine-grained analysis of the **context** in which they are run (i.e., material, social and institutional dimensions of practices)[13]. Following Nevens et al. (2013: 114) "the first step in changing a system is getting to know it". This phase includes not only gaining data on systems of energy provision, infrastructures and metering but also determining formal and informal institutions, rules, values and norms, and other elements that outline the local practice cultures of energy use.

This phase also includes identifying the relevant local stakeholders and their role in practices related to energy use, as well as other actors who are likely to benefit from and use the information and lessons provided by ELLs. As certain interventions might prove "too extreme", attention should also be paid to the likelihood of practices being able to be adopted by a diverse range of households rather than only being applicable to a limited number of households in certain specific contexts.

4.2 MAPPING PRACTICES

The second phase of mapping practices includes assessing the baseline of energy use and carbon emissions and the practices related to energy use, as well as setting a target for practice change.

From the perspective of environmental sustainability, it would be important to target consumption domains that are the most significant in terms of **energy use and carbon emissions** which in theory have the most potential for significant reductions (see Tukker et al. 2010). ELLs thus focus on the practices within domains of space heating, water heating, daily mobility, cooking and laundering, as these practices directly relate to household energy use and are likely to include practices and practice configurations that are more or less open for change.

To enable comparisons between ELLs, the **number of domains** is limited to two in each participating household. The first domain is the same for all ELLs in each country, whereas the second domain can be different for ELL1 and ELL2. It is ensured that all the households in ELL1 and ELL2 in each country engage in the same practice domains, as well as that the selected domains are relevant in terms of energy use in the particular context. Within the both domains, changes are targeted in one or two practices (e.g. adapting heating practices and airing practices in the heating domain, or showering and

[13] This phase has already been started in National Brief documents of each country in WP2. However, in this phase a more detailed analysis, focusing also on the sub-national aspects, will be conducted.

washing dishes in the domain of hot water use). It is also worth considering the extent to which some practices, such as those related to heating, are easy to change through short-term actions taken by households within the ELLs, and to what extent they are determined by broader institutionalised societal practices (such as building design and governance). From this perspective, it is advisable to consider – alongside environmental relevance – also the extent to which practices are taken-for-granted (i.e., "sticky") and the extent to which they are socially important.

Together with households, we **discuss, expose and learn about the practices** that lead to energy use, and map the most energy intensive practices as well as underlying social norms and conventions, required skills and material components, and rules and regulations, with a special focus on the two domains but also acknowledging the other energy-relevant domains (see also Devaney & Davies 2016; Scott et al. 2012). Questions of why the practice has the level of energy use it has, and how this is related to the way it is constituted, form an important first step in co-producing knowledge and identifying opportunities for change (see examples of relevant elements in each practice domain in Table 5). Kuijer (2014) also suggests tracing the practice in (personal) history and observing life-time changes in practices and its implications for energy use, as well as the situations in which adaptation and improvisation in practices have happened[14].

The overview of relations between energy use indicators and the constitution of the practice (including inertia of the existing practice and potential tensions in performing the alternative practices) forms the basis for the identification of the target for practice change (Kuijer 2014).

The mapping also includes **participants' needs, expectations, inspirations and motivations** – discussing them and making them visible for both researchers and households themselves and also gaining more understanding on what practices are easier and harder to change and why and what kind of internal dynamics in households are related to performing practices. Households can engage because of costs and attempts to lead a more decent life, environmental reasons, due to social influence or pressure, or because of a desire to learn about new solutions and technologies. Some people might simply like a change or to simplify their life. From a practice perspective, and when ambitions about reducing energy use are high, initiatives also need to consider how energy related needs are defined. Utilising the idea of co-creation, we support and encourage households to co-construct ways for shifting these practices onto more sustainable pathways. Relevant stakeholders may be included in this phase, to provide local expertise and support.

The aim of ELLs is thus not to conduct uniform interventions, since previous research has shown that the reactions to, and impacts of, these interventions will likely vary across, and even within, households (e.g. Devaney & Davies 2016). Instead, our aim is to fit the change initiatives to the diverse practice cultures and provide context (in)dependent tools to change particular practices (see also Laakso & Heiskanen 2017). Mapping what practice-configurations are being performed in relation to each energy-relevant domain allows for adopting more suitable measures for each household and site. The close collaboration and co-creation with households also helps the households to take

[14] These adaptations and improvisations may be related to temporary changes in norms of cleanliness in festivals (Hitchings et al. 2017) or adaptation to cold during power failures (Rinkinen 2015), to name some examples.

ownership of the changes, thus making the participation and the measures more meaningful for all members of the households, and potentially overcoming the challenges related to involving all household members identified by e.g. Devaney and Davies (2016).

Table 5. Examples of the relevant elements in each practice domain.

Practice domain	Relevant elements		
	Material	**Meaning**	**Competence**
Practices related to home heating	timers for thermostats, programmable thermostats, DIY insulation, blinds, shades, curtains, carpets, fans, home automation, apps	overheating as unhealthy, waste of money or environmental risk, importance of fresh air, active heat management as increased control of the house	better understanding of how heat management works and of options, skills of using and maintaining heating systems, ability to adapt practices to peak power periods
Practices related to hot water use, especially showering	low-flow taps, timers, meters, more efficient boilers, pipe and boiler insulation, temperature control	excess showering as unhealthy, bad for skin and for environment, saving time in the mornings	skills of quick showering, learning about alternatives
Practices related to laundering	spot cleaning, brushing & airing clothes, drying, low-flow taps, meters, more efficient appliances, detergents	lowering standards of cleaning to avoid allergies, increasing the durability of clothes, preserving environment, saving water and time	unlearning cleanliness, planning and washing full loads, air drying, airing clothes, washing at lower temperatures
Practices related to cooking	apps for collective meals, more efficient/smart appliances, buying perfect amounts in a cooking box	eating together, saving energy when cooking, not having to cook every day (easiness, saving time)	energy efficient cooking (e.g. baking lots at once, exploiting afterheat), cooking with microwave, preserving and storing food
Practices related to personal daily mobility, especially car driving	low-carbon vehicles (electric, biogas), new schemes for multimodal transport (mobility as a service), (electric) bicycles, devices for monitoring fuel use and offering tips on fuel efficient driving, online platforms for car-sharing and -pooling, safe cycling lanes, possibility to combine cycling with other modes of transport	environmental awareness, safety and health issues, less time for other practices (exercise, reading, etc)	new skills of cycling (and cycle maintenance), using public transport, sharing or pooling cars, fuel-efficient driving and car maintenance

The community element to be added in this phase is a co-creation session in which the participating households gather together to discuss the social norms, rules and other elements steering the practices related to energy use, and how to collectively address and challenge these elements to change practices. On the basis of previous studies (e.g. Jack 2013), this kind of peer support is important in disrupting and challenging the prevailing assumptions on what is normal or acceptable – and this kind of collective session also opens up the dynamics of practice and opportunities and/or obstacles related to their change, outside the individual household (cf. Devaney & Davies 2016).

4.3 IDENTIFYING MEASURES

Unlike more “traditional” living labs with the aim to develop new products or services, ELLs create a temporary time and space where **established routines are disrupted** to facilitate learning about new practices. Households are supported to challenge the underlying assumptions on how to properly perform practices, and think about the ways to change elements of practices or the whole practice and the ways they are connected. ELLs also aim to embrace the idea of **sufficiency and undoing** – efforts that aim to reduce energy use (rather than improve it by e.g. replacing the source of energy to renewables, see Sahakian & Bertho 2017). This also separates ELLs from living labs which highlight the role of ICT and technologies in innovations, by reminding that many of the sustainable solutions already exist and do not require vast investments. Thus, the ELLs focus on how to change practices and their constituting elements, instead of merely focusing on technologies or other related solutions making the present practices more efficient without fundamentally altering them. This is done by providing a **menu of measures** (Table 6), designed on the basis of three frames of Spurling et al. (2013): re-crafting practices, substituting practices and changing how practices interlock. This phase loosely corresponds to the “suggest and trigger” phase used by Kuijer (2014).

Table 6. Menu of suggested measures to change daily practices in ELLs.

	(1) Recrafting practices	**(2) Substituting practices**	**(3) Changing how practices interlock**
Practices related to home heating	Adaptive heating practices: turning off heat in unused spaces (with/without the help of devices), creating hot spots, turning off/down heating at peak power periods	Heating people not rooms (pullovers & slippers, electric blankets, portable heating devices, reordering furniture), substituting passive time at home (e.g. TV time) with outdoor exercise	Retiming cooking practices to benefit from or avoid heat from cooking, teleworking from a hub instead of home (to avoid the need to heat for one person only), integrating heating/ventilation/ cooling practices in morning/evening routines
Practices related to hot water use, esp. showering	Shorter/colder showers	Splash washing, sponge baths, dry cleaning	More efficiently combining practices of exercising and showering, using public baths (also as means for relaxation)
Practices related to laundering	Washing full loads, appropriate temperature settings, environment-friendly detergent, new storing practices to avoid mixing dirty, used and unused clothes	Replacing washing laundry at home by using shared laundry rooms in the building, replacing washing by airing clothes, spot cleaning,	More efficiently combining practices of exercising (or other practices causing dirty clothes) and laundering, combining laundry practices with other cleaning practices e.g. once a week (cleaning days), sharing of washing machine with neighbours
Practices related to cooking	Using leftover food apps for meal ideas, cook for several days at once (and store meals), learning about quick-to-cook, energy-efficient meals	Replace hot dishes with salads	Connect meals to other activities (childcare, school, work, hobbies), eat together with family, friends or neighbours
Practices related to daily mobility, esp. car driving	Fuel efficient driving	Replacing car driving (even if only parts of the way) with cycling, public transport, car-sharing, carpooling	Teleworking to avoid driving, organising travel needs (e.g. shopping, leisure activities) to minimise driving, prefer local services

As the aspect of energy is central to the ELLs, general estimations on the effect of each measure on energy use are also provided. In this way households also gain more skills in assessing the scale of their actions in energy use and emissions. Simplified energy/carbon audits may be used to support these aims. Ideally, measures should target several aspects of and differences in household energy use arising from diverse practice cultures, thus also allowing better understanding of the interconnections between practices. A close focus on the interconnections between practices also helps to address the potential rebound, backfire and spin-off effects, i.e. the situations in which a change in one practice reflects on changes in other practices, either increasing or decreasing the total energy use.

4.4 TESTING

In the actual **testing** phase (or facilitating performances, to use terminology of Kuijer (2014)), households aim to change their daily practices according to the measures agreed upon in the previous phase (or, to use the terminology of Kuijer (2014) and Scott (2012), to perform the new “practice prototypes”). To help the households in this task, they are provided with tailored support, the necessary devices and immediate feedback. Households may be rewarded when they achieve some midway goals, thus employing challenge and game elements. This way the ELL design follows the findings presented in D3.1 (Laakso & Heiskanen 2017; see also Heiskanen et al. *forthcoming*) on the engagement tools potentially successful across European practice cultures.

Needs-based, tailored support aims to change practices while simultaneously making everyday life easier for the participating households. When changing practices, special attention is paid to how the changed practice, or a set of practices, fits into existing practices (i.e. on how practices interlock). The development of new competences and meanings are supported, while offering technical support and advice. This may also include support from relevant (local) stakeholders, such as municipal actors, businesses and organisations. Stakeholders could also support the ELLs with necessary materials required for execution if such opportunities should emerge in the co-creation process (such as the provision of meters and/or other equipment to follow energy consumption or even clothing such as cardigans).

Learning by doing starts with material engagement with devices or DIY projects, with the aim being to create new competences and thus to empower participants. By familiarising themselves with (e.g.) materials to improve insulation of the apartment and gaining competencies in using them, the participants can also attach new meanings related to sustainable energy use and energy efficiency (i.e. practices are re-crafted with new elements). This approach is suitable for people interested in technologies and material components and capable of making DIY projects at home. Additionally, stakeholders could support households by providing the necessary materials and information on how to use them.

Challenges frame the change in terms of fun, entertainment and rewards. Here, the focus is not as much on easiness as on setting and committing to targets and goals to be achieved during the testing phase. Participating households are provided with immediate feedback and game elements in challenging themselves, and encouraged to make quick and ambitious, although temporary, changes in their everyday life. After the challenge, households are supported in maintaining at least some of the trialled change, with the idea that even if the remaining changes are not as ambitious, they still are better than the practices at the starting point. This approach is suitable for people looking for variation in daily life, and possibly for students or other groups who are not yet able to make even small energy renovations at home.

Community learning and engagement (in ELL2) refer to an approach for engaging households that builds on existing social relations to reshape understandings of normality. This community element builds on peer-to-peer support (and even pressure), in which participating households learn from each other and are able to discuss and compare their experiences. Participants can also learn from each other from the beginning: some participants might already be doing something more sustainably than others, and these kinds of benchmarks can be useful in visioning about practice change.

4.5 EVALUATING THE OUTCOMES

Finally, the outcomes of ELLs are **evaluated.** Monitoring and comparing the sustainability outcomes of ELLs implies a high degree of consistency in sampling and Living Labs design, without ignoring differences between and within countries regarding energy-relevant practice cultures. The Sustainability Assessment Toolkit (SAT) focuses on (1) total energy use in the participating households, also including identification of rebound, backfire and spin-off effects, (2) other relevant indicators of social, economic and environmental sustainability, (3) socio-demographic influences on energy use, and (4) levels of social acceptability of the two types of Living Labs and their individual elements[15]. On the basis of the SAT, an online monitoring tool will be developed for data collection (in WP4).

The relevant **background information** of households includes sociodemographic factors such as household size, life stage, education, income level and home ownership status. The domain and site specific background information includes building type, heating system and energy source(s), energy costs, car ownership, relevant public transport connections, cycling infrastructure, ownership of washing machine and availability of shared laundry facilities and teleworking facilities. Other information includes information on communities of practice, place and interest, as well as previous engagement in energy initiatives.

In terms of total **energy use and related carbon emission** reductions due to ELLs, we need to be able to collect household consumption data both before and after the active phase of ELLs. This, in turn, requires that the participating households have access to this data (e.g. meters, billing information or online monitoring). Qualitative data including interviews and diaries (or equivalent reports) on relevant practices and their change will also help to identify potential **rebound, backfire and spin-off (or other unanticipated) effects.** Interviews can cover themes related to potential monetary costs of practice change, changes in time use, as well as changes in perceived wellbeing due to participating in ELL. These data also serve as partial inputs for the sustainability assessment. **Social acceptability** is assessed on the basis of participants' feedback and their experiences of the project. In ELL1, the interviews cover the participants' own estimation on how much they shared their experiences with their communities, whereas in

[15] A more detailed description of SAT will be provided in D3.5 (ELL Evaluation and assessment manual).

ELL2, special attention is also paid to diffusion of practices within the community of participating households. To assess **long-lasting effects** of ELLs and the ways the new practices are stabilised, the consortium partners are prepared to conduct a follow-up survey and/or interviews six months after the end of the testing phase of ELLs.

Methods for data collection can include use of surveys and questionnaires (such as survey on household appliances and their use and time-use survey) as well as use of existing metering data or data from DIY energy audits. These sources also support the in-depth data collection, such as interviews. When engaging in qualitative assessment, it should be noted that giving accounts of mundane, routine performances (especially on private actions such as those related to personal hygiene) is not easy for people. The interview templates and diary guidelines need to aim at grasping the inconspicuous elements of daily practices and the interaction with households at different phases should support this aim by reverting to a certain level of "naivety" when discussing practices and the relationship between routines and ruptures in shaping practices (see Kuijer 2014).

The evaluation is done together with households, but to assess the potential for new practices to diffuse outside the participating household or community (and the related need for refinement) the outcomes are also discussed with other stakeholders. In ELL2 (in addition to interviews with individual households) the experiences of participants are shared and compared in joint discussions. Throughout the evaluation it is important to bear in mind that targeting practices within 20 households in each ELL does not yet change practices-as-entities, and that the potential and prerequisites for wider change can only be estimated indirectly through experiences of participating households and other stakeholders involved.

What is also important for understanding the outcomes of the ELLs is the reflection by consortium members throughout the project. This follows the idea of realistic evaluation that the intervention outcomes always depend on both the type of mechanism that is used to transform practices (and thus the researchers as implementers of these chosen methodologies), and the context (Pawson & Tilley 1997). The consortium members are encouraged to pay attention to the different theories of change (also their own ones) in different phases of the ELLs (see also Laakso & Heiskanen 2017).

5 TARGET GROUPS AND SITES

As described in the previous chapters, the ELLs are focused on practices and changes in practices to reduce household energy use. Thus, also the starting point of ELLs are the energy-relevant practices, and participating individuals are seen mainly as carriers of these practices (see e.g. Shove et al. 2012) instead of setting specific target groups and then identifying the practices they are engaged in. However, throughout the process guiding the ELL design, consortium partners have also been asked to think about and elaborate the potential sites for ELLs as well as groups with which they could work during the ELLs, and discuss these thoughts with local experts in each country (see Chapter 3). This is due to the requirements set by the need for comparability and potential for upscaling of ELLs as well as the aim to engage a socio-demographically balanced group of households in each country.

The ELL design outlined in the previous chapter also poses some (material) requirements for the participating households. In order to monitor heating practices, some kind of access to metering data is necessary. There might be some difficulties in targeting apartment buildings in some countries due to lack of individual energy metering and billing. To change practices of car driving, a household needs to have a car, and changing laundering practices presupposes access to a washing machine. The participating households thus need to be engaged in particular energy-intensive practices in heating, hot water use, mobility, cooking and/or laundering.

The nature of the ELLs means that they are not designed to be representative in a statistically significant sense. Rather, the aim is to illustrate the variety of practice cultures by engaging households that represent a combination of different types of households across Europe. For this reason, as well as for comparability within and between countries, the selection of households thus has to follow a multitude of criteria which may include size, location (rural/urban), income and gender. Here, ENERGISE implements an iterative sampling process which ensures a high degree of flexibility.

In addition, participating households should include hard-to-reach households, i.e. those who are lacking the means, tools and/or reasons to save energy and who have not been actively involved in participatory processes such as living labs. The households nevertheless need to have some initial motivation to participate in living labs (i.e., to change their practices) and to observe their energy use, to participate in the project in the first place. These households may include energy-poor households; people living their “busy years” and thus in need for solutions making everyday life easier; people living in apartment buildings such as tenants, who have no interest in saving energy because they either have little insight into how much energy they use or how to influence it; and rural households who might struggle with the relative decreasing of value of their homes and thus limit both the asset increase value and profitability of investment in e.g. renewable energy.

Each ELL is also sensitive to difficult conditions in everyday life – whether these are difficulties in energy-related practices such as heating, or to practices not directly related to energy, such as child care, in which case energy saving could be combined with time saving solutions such as home deliveries, making the lives of busy parents easier. To the contrary, on the basis of the feedback from ENERGISE partners, including “already converted" households with existing environmental motivations to reduce their energy use and carbon emissions might not best serve the theoretical objectives of the project.

When it comes to ELLs promoting community-driven efforts (ELL2), elements such as 'peer-to-peer learning' usually require existing communities of peers and communities of practice underpinned by the requisite trust, familiarity and a basic sense of similarity – thus these kind of initiatives might work better within communities of place, or within communities of interest in which people are united by e.g. shared values, life situations or goals[16]. Yet within the particular social network, there also needs to be some difference, or someone to learn from. Engagement of the community also enables the co-creation of new ideas for collective systems of provision related to everyday practices. Bringing different kinds of people together, with different kinds of needs and opportunities to reduce energy use enables the creation of a plethora of novel ideas. As ideas and solutions are based on the personal experiences of people in the everyday lives they usually are better accepted by others in the community, because they may have had similar experiences and are acquainted with the context in which established practices to be changed have emerged.

The selection of participating households as well as the ELL sites could thus be done in relation to **social and material dimensions of practices**. The social dimension covers sociodemographic factors and existing social norms, whereas the material dimension includes aspects such as a rural/urban setting, type of housing and neighbourhood. Focusing on communities of place, or communities that are place-bound (at least in ELL2) enables focus on shared social norms and other underlying elements, as many of the material aspects (such as infrastructure and availability of public transport) are shared by all the members of the community (see also Chapter 2.4.2). In short, the following criteria need to be addressed when selecting the participating households and the sites for ELLs:

- The predefined material requirements (e.g. devices, technologies, infrastructures, services)
- Securing a balanced variety in terms of households size, location (rural/urban), income and gender
- Including hard-to-reach households, i.e. households who are lacking the means, tools and/or reasons to save energy and who have not been actively involved in participatory processes such as living labs.
- Not focusing on households with strong environmental motivations and vast experience in energy initiatives
- Focusing on communities of place

[16] The ELLs may stimulate or support the formation of new communities, but usually the development of a community and its elements of trust and familiarity take longer than a few months, and hence would occur after the ELL period.

6 SUMMARY AND NEXT STEPS

This document has provided information on living labs as an approach or a tool to drive sustainable (urban) development by providing spaces for innovative (bottom-up) experimentation, by facilitating systematic monitoring and learning, and by involving various actors and users as co-creators of knowledge in real-world settings. This approach has also been complemented with a practice theoretical approach taking practices and their change as the main unit of focus and analysis. On the basis of these previous experiences on practice-based living labs, as well as other sustainable energy consumption initiatives and output from consortium partners and other experts in the field of energy consumption, this document outlines the initial design for ENERGISE Living Labs (ELLs) and gives some suggestions and criteria for target groups and sites to enable successful implementation and analysis of ELLs.

The basic design of ELL (ELL1) follows five phases: (1) defining the context, (2) mapping practices, (3) identifying measures, (4) testing and (5) evaluating. The community elements (in ELL2) are added to this basic design. The phases might have some overlap – understanding the context in which practices are performed also feed to mapping practices, and identifying measures and actual testing are closely interlinked. The evaluation starts already in the first phase and when the baseline of practices and related energy use is set.

It is important to note that the designs and guiding principles for ELLs given in this document are not meant to be detailed or fixed. Further guidelines will be provided in D3.4 (‘Easy-to-use ENERGISE Living Lab intervention and engagement guidebook’, which offers a manual on the formats for engaging households and communities, as well as defines methods, techniques and tools for ELLs and their timing) and D3.5 (‘ENERGISE Living Lab evaluation and assessment manual’ and the Sustainability Assessment Toolkit (SAT), which is a more detailed description of the output, outcome and impact indicators and measures, as well as detailed methods for baseline definition and identification of rebound and spin-off effects). Just like other social experimentation with a variety of actors in real-life settings, living labs embrace the idea of uncertainty (Karvonen & van Heur 2014). It is thus important to acknowledge that not everything can be planned beforehand, but there always exists some level of openness and contingency in the design.

The next steps in the ELL design process include development of the above-mentioned documents as well as organising the ELL Pre-test workshop, in which the more detailed formats, methods, techniques, measures and tools will be tested and further elaborated. 35 consortium members, ENERGISE Expert Panel members and other experts have expressed their intention to participate in the workshop in Helsinki, in December 2017. D3.3 (‘ELL Workshop report’) will describe the outcomes of this workshop, as well as the previous workshop in June 2017 in Dublin. The design process has been, and will be, conducted in close collaboration with WP4 leading the planning, implementation and monitoring the ELLs. Further collaboration will also be continued with WP5 to secure that the ELL design supports the analysis and comparisons of how contexts and practice cultures, as well as the intra- and cross-national differences and similarities in ELL design, influence implementation and results.

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APPENDIX 1

Summarising our WP3/WP4 workshop: feedback and summary questionnaire

On the basis of ideas for ELL design proposed and discussed in various formats and groups in Dublin, we would like to ask each partner (i.e. organisation) to think about how you feel about the ELL design and implementation plans at the moment. Please respond in approximately one para per question.

1. What types of measures or initiative design elements would you like to include in the two ELLs in your country?
2. With what types of stakeholders (existing initiatives, policy or civil society organisations) would you like to collaborate and with what target groups (socio-demographic, geo-location) for each of the ELLs – and why?
3. Have you discussed any of these ideas with possible implementation partners? Please state with whom and with what outcomes.
4. If, for some reason, you are not able to work with the specific group(s) mentioned in point 2, which other groups would you be comfortable working with using these measures?
5. If you are not able to work with any of the groups mentioned above, which groups would you be uncomfortable working with using these measures?
6. How well do you think these measures and design elements (mentioned in point 1) would work in the other 8 ELL countries?
7. To what extend does your preferred package of measures and groups address hard-to-reach groups?
8. To what extent does your preferred package of measures and groups address (nationally or locally) prioritised groups?
9. What measures would you not like to include, where and why?