

Experimenting with resource-intensive practices and related energy consumption levels

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Abstract

It is widely accepted that the well-being of humans and other species now and in future generations is vulnerable to the effects of climate change and that urgent mitigation measures are required (IPCC, 2014, 2018). Ecological and environmental crisis and severe resource depletion mandate a need for fundamental social change in systems of production and consumption (e.g. COP 21, Paris Agreement).

Despite significant efforts by the EU as well as national and municipal governments to reduce domestic energy consumption over the last 20 years, traditional problem framing (which has typically relied on a mix of rational consumer choice models, efficiency measures and information-based behavioral change theory) has failed to deliver anticipated reductions (e.g. EEA, 2013). New problem-framings are needed to understand and engage with the challenge of high levels of energy consumption. In the EU-funded research initiative ENERGISE, practice-theoretically inspired ways of understanding and challenging current resource intensive, domestic practices are developed and tested. This paper presents 1) the role of social scientific enquiry in developing such new ways of understanding and challenging resource intensive practices as well as 2) the role of related methods in rolling out experiments, which seek to reduce energy consumption accordingly. This paper discusses and exemplifies these dynamics by presenting the process of conducting ENERGISE 'Living Labs' involving Danish households to challenge their resource intensive practices related to home-heating and laundry routines.

Introduction

The well-being of humans and other species now and in future generations is vulnerable to the effects of climate change and radical changes are urgent and required (IPCC, 2014; 2018). Despite significant efforts by the EU as well as national and municipal governments to reduce domestic energy consumption over the last 20 years, traditional problem framing (which has typically relied on a mix of rational consumer choice models, efficiency measures and information-based behavioral change theory) has failed to deliver anticipated reductions (EEA, 2013). The continued ecological and environmental crisis and severe resource depletion thus mandates a need for other ways of understanding and facilitating change in systems of production and consumption (e.g. COP 21, Paris Agreement). However, the necessary radical change processes are unlikely to come about if we keep building on traditional theoretical concepts of change that are incorporated in rational consumer choice models and certain types of efficiency measures, which currently dominate policy strategies related to changing consumption patterns (see further evidence of this in Sovacool 2014; Shove 2017; Foulds et al 2017; Labanca and Bertoldi, 2018). Therefore, considering that conventional approaches offer inadequate potentials for radical change, new problem-framings (here understood as new ways of defining what the problem is and how to change it) are needed to conceptualize, understand and engage with the challenges of high levels of energy consumption.

Building on the idea that theories produce particular forms of knowledge and, with that, ideas about the spaces in which change can or will occur, problem framings are the starting point in providing different conceptualizations for *facilitating* change in resource intensive consumption patterns. In EN-

ENERGISE¹, practice-theoretically inspired ways of understanding and challenging current resource intensive practices and related energy consumption levels have been developed and tested. A practice-theoretical perspective on change (and related space(s) through which change can come about) offers different – and to some extent incompatible – explanations and related spaces for change, than accounts provided by rational consumer choice models and certain types of behavioral change theories. Where behavioral change theories often take individuals attitudes, behaviors and choices to be central reasons – and therefore targets – for changing consumption patterns (Shove 2010), theories of social practices ask altogether different questions about *what* consumption is and *why* it is as it is (Shove and Walker 2014). In theories of social practice, it is the practices within which people engage that take center stage, why norms, ideas, traditions and habits are understood to be stabilized as well as challenged in different kinds and types of socio-material configurations of everyday life.

Following this line of argumentation, ENERGISE thus understands interventions in norms, routines and habits related to domestic consumption areas to be interventions in relationships between particular configurations of images, skills and material arrangements in specific moments of time and space. With this in mind, ENERGISE has developed a Living Lab Approach, that takes practices to be the unit of analysis – and intervention.

This paper will proceed as follows: in the next sections, we present 1) the ENERGISE Living Labs developed as part of the ENERGISE project. Thereafter, by means of taking point of departure in how the ENERGISE Living Labs was conducted in a *Danish setting*, we will describe in more detail 2) what type of social scientific enquiry a practice-theoretical understanding draws on, and lastly 3) what that means methodologically and practically in experimenting with resource intensive practices and related energy consumption levels. We, the authors of this paper, were primary investigators and facilitators of the *Danish* ENERGISE Living Labs, and the subsequent sections will thus reflect our practical and methodological work with the ENERGISE Living Lab Approach in the Danish contexts. The overall approach (design and aim) was developed through a collaborative approach between all ENERGISE partners.

ENERGISE Living Labs as experimental change processes

ENERGISE is concerned with a social-scientific understanding of energy consumption and its transformation and thus utilises a socio-cultural framework for understanding the socio-materiality of resource intensive practices. ENERGISE is a three year pan-European project, that was kicked off in December 2016. ENERGISE is comprised of three overall parts, with the first one (finalised in early 2018) concerned with developing a large, typologized database of existing European Sustainable Energy Consumption Initiatives (SECI) and their embedded prob-

lem framings (for more information on the database, please consult Jensen et al (2018)). The second, and main, part of the ENERGISE project has aimed to design a Living Lab approach to energy consumption interventions based on 1) the lessons learned from the review of existing SECIs and their embedded problem framings and 2) existing practice-theoretical accounts of interventions in resource intensive practices. Actual Living Labs based on the resulting design have been carried out during the autumn 2018. The third and final part of the ENERGISE project is involved with analysing the results of the ENERGISE Living Labs and to conclude what the analyses mean for a broader range of actors, hereunder policymakers. The final part of ENERGISE is taking place during the year of 2019, and thus no final conclusions of the ENERGISE Living Labs can be drawn for the purposes of this paper. However, the practical and methodological implications with conducting ENERGISE Living Labs comprise the core focus of this paper.

As ENERGISE is concerned with exploring energy intensive aspects of ‘normal life’, and – in contrast to most behaviour-change programmes – how ‘normal life’ have been materialised and institutionalised in cultures, products and systems (and vice versa), a focus that positions energy consumption as a problem that goes beyond traditional behavioural and technology oriented problem framings is key (Shove and Walker, 2014; for more details about the general theoretical framework of ENERGISE, please consult Rau and Grealis, 2017). With this perspective in mind, ENERGISE has designed a Living Lab Approach that takes point of departure in understanding and challenging patterns of everyday life, more specifically (but not limited to) those related to routines of doing *laundry* and *heating* the home. For further details about rational and scope of the overall Living Lab Design, see Heiskanen et al (2018) and Backhaus et al (forthcoming). However, for the purpose of this paper it seems appropriate to highlight that, on average, practices related to heating, cooling and domestic hot water constitute 85 %, and heating alone about 78 %, of household energy usage in Europe (Laakso and Heiskanen, 2017). While not constituting a particularly large part of domestic energy consumption, laundry, from a historical perspective, has increased significantly in Europe as a result of technological advances and concurrent rises in standards of cleanliness, initially promoted by public health and hygiene movements and later by commercial interests (Shove 2003).

With an eye to exploring socio-material aspects related to heating and laundry, as well as assessing cultural similarities and differences, ENERGISE Living Labs have been conducted in eight countries across Europe. Further, in order to assess potential differences in individual and collective change approaches respectively, two different approaches have been utilized in each country. The ENERGISE Individual Living Lab, ELL1, has employed an approach tailored to visits with individual households, whereas the other ENERGISE Collective Living Lab, ELL2, focused on bringing the participating households together in deliberation and experimentation.

Participants for all the ENERGISE Living Labs were recruited over the summer 2018, by means of a recruitment survey developed by the ENERGISE team and, in Denmark, the survey was distributed through authoritative channels of Roskilde Municipality. With the help from the municipality, sites were selected to which the recruitment survey would be distributed. The sites

1. 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 program 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.

were sampled in such a way that residents from a mix of socio-demographic profiles would be reached. The recruitment survey sampled respondents in such a way that it would be easy to identify types of houses, socio-demographic composition of households, levels of energy consumption and access to heating systems and laundry machines. Respondents finally selected for the ENERGISE Living Labs were sampled to represent a broad range in relation to age, gender, income and household size. As a result, 18 households were included in ELL1 and 20 households were included in ELL2, in the Danish ENERGISE Living Labs. ELL1 was situated in Viby Sjælland, a small town that is part of Roskilde Municipality, and ELL2 was situated in Trekroner, another area of Roskilde Municipality. The two sites represent two different areas within the Municipality, which particularly vary in relation to the development and planning phases of the areas, the age of houses, types of buildings and to some extent in relation to socio-demographic parameters, such as income and age distribution amongst residents.

Each of the Danish ENERGISE Living Labs were kicked off in September 2018, with individual first meetings with all 38 households. The first meetings were conducted to introduce the idea and focus of the Living Labs and related experiments in more detail, to place temperature loggers and to install energy meters on washing machines and tumble dryers where possible². At these meetings, we also drafted up the floor plans of each house, both to mark the position of the equipment and to note the geographical location of the home, making it possible to later assess the result of the experiments in relation to weather conditions and everyday usages of the various rooms in the home. Finally, we wrote up ethnographic field notes that included impressions of participants as well as any particular socio-demographic details. By means of the first meetings, a baseline period was kicked off, where all participants were asked to monitor frequency and type of laundry, as well as indoor temperature in two to three different rooms together with an indication of whether the participant (and other household members) found the temperature comfortable or not (regardless of whether the heating was turned on or not). The baseline period lasted from mid-September to mid-October for laundry, and from mid-September to beginning of November for home heating.

A second meeting with all households was conducted early to mid-September. In ELL1, visits were done with each household individually, and was facilitated through semi-structured interviews. In ELL2, one large common meeting was arranged within the community. The common meeting included three focus group discussions. These second meetings, both individual and collective, were held to gather knowledge about existing routines and habits related to both laundry and home heating, as well as to commit the participants to engage in the

two pre-determined challenges that would run for 7 weeks subsequently to the second meetings. As participants had already been engaged in registering frequency and levels of comfort for a while, this “deliberation phase” was designed to flesh out details about ideas, competences and material infrastructures related to participants’ existing ideas and notions of comfort and cleanliness.

The pre-determined challenge related to laundry tasked the participants to reduce laundry cycles to half of what they had registered as the number of weekly cycles as part of their baseline. The pre-determined challenge related to home heating tasked participants to reduce indoor temperature to 18 degrees Celcius regardless of the average temperatures they had registered as ‘normal’, as part of their baseline. As such, the laundry challenge enabled *relative* reductions in energy consumption related to phenomenon of producing laundry, and the heating challenge enabled absolute reductions in energy consumption related to space heating (as the 18 degrees limit was equal for all, regardless of baseline registrations). Each of the challenges ran for at least 4 weeks, with one-week overlap between the two. Almost all participants agreed to try out the ENERGISE pre-determined challenges³.

The participants were provided with a Challenge Kit to accompany each challenge, which included various accessories to facilitate a successful challenge period. For instance, the Laundry Challenge Kit included a coatrack that could enable an organised ‘intermediate station’ for clothes that had been worn but would not need to be washed, so that the clothes could hang instead of lying on a chair or on the floor (and then risk being thrown in the washer anyway as a result of tidying up). The Heating Challenge Kit included various symbolic things that switched the focus away from heating up spaces to heating up bodies instead, such as hot cocoa and socks.

In December 2018, the ENERGISE Living Lab period was concluded with a third and final individual visit (ELL1) and focus group meeting (ELL2), both organised in a similar fashion as the second visits. The visits were conducted to qualitatively explore participants’ experiences with the challenges. To complement the qualitative visits and interviews, a baseline survey, 11 weekly surveys and an exit survey were sent out to each participant during the Living Lab period as well.

Taking point of departure in the ENERGISE Living Lab Approach, as presented above, the following sections will discuss the contribution that particular types of social scientific enquiry may offer to the study of sustainable consumption, as well as its potential for facilitating spatio-temporal reductions in energy consumption. In particular, we will suggest what a practice theoretical explanation may offer in contrast to more dominant behaviour change programmes. Finally, we will discuss opportunities and challenges with building on a practice theoretical understanding of consumption when developing and carrying out an experimental process for reducing consumption related to laundry and home heating.

2. It actually proved very difficult to install energy meters in the Danish cases, as product plugs and meters did not always match, and in most cases, washing machines and dryers were installed in closed off cable boxes, making the plugs inaccessible. As a result, only a few energy-meters were installed in the Danish ENERGISE Living Labs. This did not affect the data-collection, as energy-metering data were excluded from the Danish sample altogether. In the few cases where energy metering was possible, the data is used to indicate approximate levels of energy-consumption reductions resulting from changing the laundry temperatures (e.g. going from 40 degrees Celsius to 30 degrees Celsius programs. However, as metering is not of core focus to the ENERGISE Living Lab Approach, the lack of energy metering data is not significant.

3. Participants were invited to formulate their own challenges, if they did not feel that they could commit to the ENERGISE challenges. One could e.g. not reduce to 18 degrees Celcius due to building regulations in their home-association (a tenant) and a few stressed that they could not possibly cut their laundry cycles to half as they were under the impression that they were already doing very few laundry cycles.

	Summer	2018				2019		
		September	October	November	December	... March	... May	
Activities/ interviews		Intro	Deliberation Challenge Kick-off	Challenges	Exit	Follow up	Conference with participants and other several stakeholders	
ELL1	n=18	individual	individual	individual	individual	individual	collective	
ELL2	n=20	individual	collective	individual + collective	collective	individual	collective	
(complementa- ry) surveys	recruitment	Baseline	weekly follow up	weekly follow up	Exit	Follow up		

Figure 1. ELL process and timeline.

The role of social scientific enquiry for experimental change processes

Although social science is often underestimated and underutilized in much energy research and policy (Foulds et al 2017), social science is not entirely excluded from energy consumption studies. However, certain types of social science approaches are often favoured and as a result become incorporated in much of the current ways of problematizing and challenging patterns, types and reasons for energy demand and consumption (Foulds and Christensen 2016; Genus and Iskandarova 2018, Jensen et al 2018). The dominant conventional approaches most often stems from Psychology and Economics as these disciplines are usually regarded more 'scientific' as they resemble some of the approaches often implied in 'harder' sciences and engineering (Castree 2016; Genus and Iskandarova 2018). Most of the approaches applied to understanding behaviours often rely on a somewhat narrow conception of 'behaviours' as made up of individual choices, habits and attitudes (Shove 2010). These approaches also often understand energy use reductions as a matter of energy efficiency, in such a way that an inefficient solution can simply be replaced with a more efficient solution "entering seamlessly the social tissue where they are installed without causing any change but a reduction in the energy inputs needed for their functioning" (Labanca and Bertoldi 2018).

Taking laundry and home heating as examples for intervention, above understandings of energy consumption would (roughly put) imply a focus on the direct energy use connected to these domains and then, as a result, seek to make the existing energy use patterns more efficient. In terms of laundry, that could for instance be to simply propose people to use washing powder more efficiently and to wash at lower degrees (e.g. 30 degrees Celsius rather than 40 degrees Celsius) which presumably would have an impact of amount of kWh used related to these particular washing cycles. This approach would however neither challenge the frequency with which people wash nor any types of socially shared ideas about when something needs to be washed. The space for change is thus unnecessarily narrow and merely concerned with efficiency or reducing temperatures. Likewise, in relation to home heating, focus would be on directing the 'consumers' attention to efficiently managing their heating systems in such a way that the generated heat would be used as efficiently as possible. In focusing explicitly on the careful monitoring of the heating systems, inefficiencies related to current usages may be eliminated, but there would

be no focus on challenging ideas of comfort (indoor temperatures) or address the way in which we heat (heating spaces versus heating bodies).

In contrast to the approaches highlighted above, theories of social practices treat energy consumption as a dynamic by-product of everyday life practices rather than something that is meaningful in and of its own right, and therefore seek to understand dynamics of resource intensive practices rather than energy consumption itself. Understanding dynamics of practices means applying a particular understanding of social life. Schatzki describes social life as unfolding at sites, as a contingent and constantly metamorphosing mesh of practices and material orders (Schatzki 2002). Where Schatzki tends to side-track materiality as something linked to, but outside of practices, Shove explains social life as made up of bundles and complexes of (socio-material) practices; practices that are linked more or less closely and which are comprised of meanings, competences and materials (Shove et al 2012). In thinking about opportunities for change, a practice-theoretical approach would imply challenging or intervening in the ways in which a practice is comprised, whether resource intensive practices (e.g. car-based mobility) can be substituted with a less resource intensive practices (e.g. bicycle-based mobility) or whether linkages between practices can be broken or new ones can be made (Spurling et al 2013).

The ENERGISE Living Labs employ a practice-theoretically inspired framework that takes point of departure in what people do, in relation to laundry and home-heating. In revisiting the problem of energy consumption related to laundry, this means that ENERGISE assesses not only the material (energy) aspect of laundry, but also why laundry is done, how often, who is doing it, and in what ways certain laundry activities are done. Making enquiries about meanings, competences and materials related to that of *doing laundry* opens up for problematizing the frequency with which people wash, why certain items of clothes are washed at certain temperatures and how often, and why people dress the way they do, all of which generate certain patterns or levels of (perceived) laundry needs. The space for change becomes wide, as focus is both on temperature reductions and laundry cycle reductions, in that norms, routines and reasons for laundry cycle frequency are explored and challenged as well. Further, in exploring and challenging laundry frequency, ideas about personal hygiene, social signals as well as patterns of dressing and shopping may be subject to change as well.

The same goes for home heating; ENERGISE explores and assesses ideas of comfort related to home heating, as well as socially shared ideas of ‘making home’ and ‘having guests over’. In doing so, ENERGISE explores fundamental questions like; what are the expectations for indoor comfort in particular situations, and how are these maintained or challenged if home-heating temperatures are reduced; what do people do in order to keep warm, and what role does the heating system play in ways of keeping warm (it is for instance not unusual that there may be differences in ways of keeping warm depending on whether the home is equipped with floor heating or traditional space-heaters). The space for change becomes wide as both the heating system, the type of buildings, embodied understandings and experiences of comfort, ideas about homemaking and competences related to keeping warm are assessed and targeted.

As the analytical and interventional focus implied by a practice theoretical position is different from that of more mainstream behaviour change theories, several opportunities and challenges can be identified; A practice theoretical approach offers up a framework for assessing ideas about normal life related to the domains of consumption in question. Instead of addressing behaviours as results of individuals choices and preferences, a practice theoretical approach to consumption suggests understanding the ways in which the social and the material is entangled and unfolds in ways of ‘keeping clean’ or ‘keeping warm’. Drawing on Schatzkis site-metaphor while insisting that practices are inherently socio-material, it becomes possible and relevant to address socio-material spaces related to e.g. laundry and home-heating as temporary stages for exploring configurations of, as well as tensions between, bundles and complexes of practices unfolding in relation to keeping clean and keeping warm (or keeping comfortable). As a social ontology helps understanding intent and goals as part of practices, focus shifts away from objects as well as actors (and their individual attributions of meaning to particular objects and processes), towards the goals, intentions and socially shared ideas about normality that are comprised by the practices within which objects and actors engage. In taking point of departure in the practices, e.g. related to laundry or heating the home, ideas about comfort, cleanliness and convenience (Shove 2003) emerge that are shared or contested by actors and networks of actors. Such an approach or understanding offers opportunities to deliberate on – and challenge – socially shared (and embedded) ideas of comfort and normality.

These opportunities are, however, not without their problems either. Approaches that addresses and challenges ‘ways of life’ also challenges existing neo-liberal normative notions of individual consumption as being tied to notions of consumer sovereignty and individual freedom societies (Wilk 2002). If ideas about normal life are challenged, even if participants are only asked to experiment within the realms of what they find reasonable for their own everyday-life schedules, this approach is challenging, and potentially problematizing, ideas about (the right to) personal cleanliness and comfort; an approach that may be regarded anti-capitalistic and undemocratic.

On the contrary, however, questioning, deliberating and challenging ideas about normality and comfort *together* with participants offer unique opportunities to explore and address contextualised, resource intensive ways of living that can be challenged and re-negotiated with participants and are thus not imposed.

The role of social scientific methods in experimental change processes

Theoretical concepts can enable a more general perspective on specific qualitative patterns. Methods of interpreting qualitative data in terms of time, difference and change are therefore inherently ‘theory-laden’ (Halkier, 2011) and therefore correspond to the questions that have been asked through the theoretical concepts used. In the above, it is established that a practice theoretical approach asks different questions than those of more dominant behaviour change theories, and thus the (combination of) methods applied to explore and assess these questions would also need to be relatively different.

As already mentioned, in a review of existing sustainable energy consumption initiatives, ENERGISE established an overview of some of the often used methods and scales of intervention employed by what are mostly behaviour-change or technology-change oriented initiatives (Jensen et al 2017, 2018)). In initiatives that understand energy consumption change as a matter of changing attitudes and behaviours, methods utilised for interventions are often one-off meetings with participants, providing information of ‘best-practices’ and efficiency schemes. Other examples of methods can be campaigns and monetary incentives. At best, initiatives may facilitate certain forms of peer-engagement where neighbours meet and exchange methods for keeping an energy efficient home. In such cases, norms are used in a descriptive sense, which involves letting people know how they are doing compared to everyone else, often leading to gaming and other competitive-based strategies (Jensen et al 2017).

Building on the idea that energy consumption related to laundry and heating is derived from the practices related to keeping clean or keeping up appearance as well as keeping warm and ‘comfortable’, the ENERGISE approach to experimenting with and intervening in domains of laundry and home heating was comprised of a longitudinal process with several stages as well as several types of confrontation with participants. As already described, three types of interviews were conducted in order to explore different aspects of implied (and potentially dormant) ideas about how and why participants were keeping clean or warm the way they did, with what frequency, with what purpose and by which means. Furthermore, participants were given Challenge Kits that included several objects serving the purpose of challenging and reconfiguring particular practices related to laundry and heating. As an example, the coat-rack that was provided in the Laundry Challenge Kit were to serve the purpose of ‘formalising’ the space for which ‘not-clean-but-not-dirty-either’ clothes were maintained and kept in use/circulation.

Acknowledging laundry and heating as a result of socio-materially embedded practices, the ENERGISE Living Lab approach to change indeed assessed and challenged both 1) material aspects of ‘keeping up appearance’, through providing material artefacts that could help prolong the time in which a piece of clothing was used before it was washed as well as 2) social aspects of ‘keeping up appearance’, such as asking participants to wear clothes for a longer period of time before washing it, to see how they experienced this in a social setting, and to challenge whether any kind of (perceived) social pressure actually took place and/or were important for keeping clean and comfortable.

The ENERGISE Living Lab approach to challenging socio-material aspects related to laundry and heating provides a number of methodological and practical opportunities as well as challenges; As a way of exploring and interrogating socio-material dynamics of practices related to laundry and home heating, ENERGISE Living Lab Approach employed an ethnographic approach, inspired by ethnographic interviews (e.g. Spradley 1979). An experiment lasting for more than 11 weeks with active participation created a good basis for exploring nuances and details in socio-material dynamics of laundry and heating, as well as it created a temporary space that lasted long enough for establishing a basis for new habits that fitted naturally into the daily lives for most of the participants. Several participants stated, at the exit interview, that filling in diaries had become a routine. Equally, for those participants who had found ways to wear clothes for a longer time than prior to the experiment, systems for wearing clothes for longer and dressing differently had come into place. For those who did not manage to wear clothes for a longer time than prior to the experiment, the longevity of the experiment also made it possible for them to see where and how it did not work for them. As an example, some participants only experienced that their 'piles' of clothes that was not clean but not dirty either just grew bigger and more unmanageable. The length and related steps of the experiment (ELLS) thus contributed with various benefits and insights that may not have come about if only one-off meetings had been facilitated with one-way information schemes in place.

The practice-theoretical inspiration allowed the ENERGISE team to take point of departure in some of the great accounts already provided of practices and consumption domains that are the most resource intensive (energy consumption wise), the most flexible, as well as the most normative. For instance, the home heating domain was chosen as a domain for intervention in the ELLs due to home heating being one of, if not the most, energy consuming area related to final energy consumption in the residential sector (Jensen et al 2018a; Eurostats 2015), and laundry was chosen due to its alleged flexible nature; several studies claim that laundry related practices can more easily be shifted from one time to another during a day, than for instances practice related to eating dinner or working (Friis and Christensen 2016; Powells et al 2014).

Basing the ELLs and related challenges on existing knowledge from studies related to everyday life practices and related consumption, provided a scientific bases for interventions as well as it established grounds for developing specific sets of challenges, that participants could engage with and try out, all of which made sense to them through their own experiences with running a household. Not abstracting energy consumption from the activities, domains and practices through which energy consumption become meaningful made it easy for participants to make sense of the intervention *as well as* difficult because their everyday lives became challenged.

Deliberation made visible through engagement with material artefacts (Challenge Kits) also proved beneficial to most participants, as not only meanings and ideas attached to keeping clean, warm and comfortable were highlighted (and challenged), so was material aspects related to keeping clean in alternative ways (airing out clothes, or being able to remove stains without washing) or keeping bodies warm (with socks and hot tea) instead of focusing on heating spaces.

Conducting an ethnographically inspired deliberation phase as well as intervention phase is, however, a labour intensive process that requires several stages related to designing, scoping, deliberating, exploring, challenging and experimenting with socio-material aspects of practices related to the consumption domains in question. This requires a lot of resources and person-months to carry out, and it is therefore an unlikely method for larger scale transitions, particularly if moving outside the realms of research and universities. Further, at least in the Danish ENERGISE Living Labs, it became evident that the personal relationship between researchers and participants, particularly in the case of ELL1, was an important factor for the participants, as they felt a commitment towards the researchers in terms of trying out (and sticking to) the challenges. In fact, it was surprising that the individual commitments between researchers and participants in ELL1 seemed to cement a bigger commitment to the experiments than the staging of a collective approach to change, as was the purpose of ELL2. It seems unlikely that future sustainable transition processes should or could rely on personal commitments between change agents and participating people to this extent.

Although the ENERGISE Living Labs built on a practice theoretical approach to change and thus anticipated that any kind of change would have to be facilitated as changes in performances as well as entities of practices, the ENERGISE challenges were based on existing accounts of laundry and home heating and related practices, and therefore in no particular way scoped on the basis of the participants individual needs, requirements and experiences. Therefore, the participants' way of relating to the two topics/domains were different and varying. Some participants immediately saw the idea with exploring dynamics of laundry and home heating where as others – often participants with young or teenage kids – had hoped that they could explore energy consumption levels related to other domains, such as the use of computers and smart phones. The level of commitment to the challenges, as well as the level of perceived relevance thus varied across participants. Never the less, during the exit interviews, many of the participants stated that it was nice to engage in challenges that seemed well-founded and specific, probably also due to the fact that the ways in which the participants chose to handle the challenges were up to each participant (of course guiding was provided). By not allowing the participants to completely freely choose which domain they wanted to challenge (which co-creation might imply), participants who did not initially see much room for change in their existing daily life patterns, actually experienced that energy consumption could be lowered within these two domains, because they were challenge in unexpected ways.

Concluding remarks

From the ENERGISE review of existing sustainable energy consumption initiatives (Jensen et al 2017) it seems that emphasis is often put on the (individual) consumer to make sustainable choices when it comes to reducing energy consumption within many of the behaviour-change oriented initiatives. Responsibility for energy reductions and -efficiency therefore often lies with the consumer, if not delegated to technological optimization. However, as it is becoming increasingly evi-

dent that wider, systemic change is needed to meet the Paris Agreements (Bjørn et al 2018; Alfredsson et al 2018), placing responsibility on the consumer alone seems moot if not altogether misguided. Preliminary results from the ENERGISE Living Labs show that heating systems, building designs, infrastructures and socially shared ideas about normality and appropriateness play a crucial role in household energy consumption patterns.

Therefore the ENERGISE Living Lab approach and preliminary results suggest that interventions and experimentations should be designed with an eye to involving multiple actors to take action at several stages to provide wider spaces for change. Inviting several actors to participate in a discussion and process about how to (locally) design and plan for lowering energy consumption, in this case in relation to laundry and home heating, means broadening the space for experimentation and change. It also implies that responsibility for change becomes shared between several actors and that (change) agents are understood to be part of what they are seeking to change instead of understood as 'transition managers' that are 'outside' of what they are trying to change, ultimately treating behaviours as something that can and should be 'governed' (Sahakian and Dobigny 2017). Facilitating a delegation of responsibility across several actors opens up for actors exploring and discussing their own positions towards transition processes; how each actors perceive energy consumption to be a problem (or not) and thus actively invite actors to be reflexive about their own problem framings, the normativity of the framings and the potential conflicts between them. The potential for decisive transitions highly depends on problem framings to address normative aspects in order to reduce current resource-intensive consumption practices, and intervene in the intersections between practices in which consumption is configured.

Such a process is not without challenges, and it requires inclusion of powerful and relevant actors in order to create space for multiple actors and positions to deliberate, agree with and contrast each other in such a way that the problem framings become clear and potentially negotiable. In order to change existing resource intensive practices, new potential partnerships between actors from knowledge institutions, policy, business and civil society need to be facilitated in order to create a common responsibility and outset for the unfolding of a range of change initiatives, so that these becomes anchored across actors.

We argue that practice theoretically inspired frameworks for assessing and challenging resource intensive consumption patterns produce more comprehensive (and potentially more complex) spaces for change and interventions than more conventionally used concepts do. The ENERGISE Living Lab Approach underpins the need for broader framings that addresses multiple socio-material aspects. However, the applied methods involved complex and labour-intensive procedures to establish the tested spaces for intervention, which is unlikely to be viable in bigger change processes. Yet, learning from the focus of the ENERGISE Living Labs, the units of intervention, the longevity of the process as well as the practical steps for facilitating interventions that addresses social as well as material issues related to heating and laundry may serve as useful inputs for future experimental change processes.

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