# Achieving sustainability transitions in residential energy use across Europe: Do problem framings within existing initiatives match current and future needs?

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## Abstract

The European Commission are promoting several climate and energy targets, which attempt to reduce greenhouse gas emissions and decarbonize the economy. However, the current pace and scale of change is insufficient to achieve the necessary sustainability transition in the energy system. There is an increasing realisation that meeting energy targets is highly dependent on several complex aspects of final energy consumption patterns (EEA Signals 2017). Several academic claims assert that current endeavours to implement energy efficiency policies are not appropriately dealing with social and cultural aspects of energy use, thereby limiting their potential for initiating long-term transformation.

Recognizing these concerns, this paper reports on a large-scale review of over 1000 Sustainable Energy Consumption Initiatives (SECIs) that aim to reduce residential energy use and related CO2 emissions across 30 countries in Europe. One of the most significant contributions of the paper is the categorisation of the initiatives and the development of an innovative Problem Framing Typology (PFT). The typology contains four categories, all of which are developed according to how the empirical data corresponds to the analytical interest in reviewing and highlighting different kinds of problem framings within energy consumption initiatives.

According to an increasingly convincing body of research literature, problem framings that treat energy consumption as a result of social practices and complex interactions between changes in technology, changes in business models and services, and changes in everyday life, are more likely to bring about meaningful and lasting changes in energy consumption (eg. Shove 2010; Spurling et al, 2013; Southerton et al, 2011). Therefore, SECIs that falls under category 3 and 4 of the PFT would arguably be preferable and more likely to lead to long-term transformation. Applying the PFT to over 1000 SECIs shows that merely 11% of the SECIs correspond to problem framing category 3, and a further 13% of the SECIs correspond to category 4. The majority of SECIs are positioned within problem framing category 1 and 2, which indicates a strong ongoing bias towards material and technical solutions within energy transitions.

*These cutting edge results, clearly contribute to wider debates on governance and policy instruments for stimulating transitions and indeed contribute to the conference's overarching theme of system configuration, hence this paper directly responds to Track 1 and 4 of the conference.*

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# 1. Introduction

In response to the increasingly urgent climate change challenge, the European Commission are promoting several climate and energy targets, which attempt to reduce greenhouse gas emissions and decarbonize the economy. However, the current scale of change is insufficient to achieve the necessary sustainability transition in the energy system (COP21, Geels et al, 2017). There is an increasing realisation that meeting energy targets is highly dependent on several complex aspects of final energy consumption patterns (EEA Signals 2017). Several academic claims assert that current endeavours to implement energy efficiency policies are not appropriately dealing with social and cultural aspects of energy use, thereby limiting their potential for initiating long-term transformation (see e.g. Foulds and Christensen 2016). Labanca and Bertoldi (2018) argue that the main ingredients of current policies concerning energy use can be described as understanding changes in energy consumption as a mix of behaviourally, economically or technologically driven energy efficiency improvements (p. 495), a view shared by Foulds et al (2017) in a recent report on the role that social science and humanities play in energy related research. This tradition in much energy related research and policy has taken hold in spite of the fact that an increasing number of studies show that technological (efficiency) improvements alone will not meet the required reductions in carbon emissions, and targeting individual behaviours brings about limited changes in actual energy consumption patterns (e.g. Fuchs and Lorek, 2005; de Konig et al, 2016; Foulds and Christensen, 2016; Bjørn et al (forthcoming)).

Reasons for these shortcomings may be multiple, but, nonetheless, energy efficiency improvement strategies often depend on abstracting efficient (as well as inefficient) solutions from the social organisation within which these solutions unfold. This somewhat dominant perspective – in turn – means that energy efficient improvement strategies assume that solutions can be "surgically removed and replaced by other solutions, seamlessly entering the social tissue where they are installed, without causing any change but reduction in energy inputs" (Labanca and Bertoldi, 2018, p. 496). These assumptions, however, completely disregard any potential negative impacts occurring due to technological changes, which often include so-called rebound effects as well as increases in resource intensive activities (ibid), such as more time or money to do other things. Shove (2017) argues that these (counter-productive) results of energy efficient improvement strategies are due to the fact that the ways of thinking about energy efficiency are themselves 'performative' and that they end up perpetuating meanings and levels of services related to existing (unsustainable) types and patterns of consumption, rather than effectively challenging them. These claims certainly highlight the need to scrutinize the content and extent of existing sustainable energy consumption initiatives. This paper sets out to do exactly so, by presenting and discussing the typological assessment of 1000+ European Sustainable Energy Consumption Initiatives (SECIs). The collection, review and assessment of the SECIs have been carried out as part of the current ENERGISE project[2]. **The paper unfolds as follows; section 2 contextualises the remainder of the paper by briefly introducing a definition of SECIs, as well as the process of identifying, reviewing and collecting data on SECIs. Section 3 presents the conceptual work of developing typologies of SECIs based on the review and by responding to abovementioned issues related to *problem framings* in much energy-related polices and initiatives. Section 4 presents the findings from the typologised SECIs and section 5 concludes the implications of the results.**

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# 2. Sustainable Consumption Initiatives

Sustainable consumption initiatives conducted across the world are multifaceted in content, scale and approach. Researchers and practitioners involved in such initiatives are equally multifaceted in approach, goals and agency. Networks such as STRN, EASSN, SCORAI and Future Earth's Knowledge Action Networks provide great spaces where knowledge and experience of such endeavours can be fostered and channelled. Similarly, several research projects are committed to researching and disseminating knowledge and results from ongoing sustainable consumption initiatives; for example, SHARECITY reports on scale, content and performance of a range of food sharing initiatives (Davies et al, 2017) and Jager-Erben et al (2015) report on the innovativeness, formality, communality and personal engagement of numerous social innovation initiatives towards sustainable consumption. Yet, although it is recognized that sustainable consumption initiatives are heterogeneous and respond to several, complex problems related to consumption, (sustainable) energy consumption initiatives are often focused on technical dimensions, and energy efficiency is often the go-to solution in much (policy) debates of energy consumption issues (Foulds and Christensen, 2016; Labanca and Bertoldi, 2018).

Hence, there appears to be a growing call for understanding better the socially shared and institutionalized dimensions of energy consumption (Shove, 2010; Genus and Jensen, 2017). Therefore, assessing the role that these dimensions are given in actual sustainable energy consumption initiatives is crucial. Seeking to explore and assess particular aspects about sustainable energy consumption initiatives means to establish research questions that enable particular types of inquiries, which at the same time arguably exclude other types of inquiries. The following sub-section provides a 'definition' of what a sustainable energy consumption initiative is taken to be in the ENERGISE project, followed by a brief presentation of the methodology employed in reviewing and selecting initiatives within this definition. The section is concluded with a short discussion of what kind of research this methodology enables and how that corresponds to the concerns depicted earlier in this introduction.

## 2.1 Sustainable Energy Consumption Initiatives (SECIs)

In ENERGISE, 'Sustainable Energy Consumption Initiatives' (SECIs) are defined as activities that deal with reducing energy related $CO_2$ emissions from households. This can either be in terms of reducing the actual energy consumption or by substituting fossil fuels with renewable energy sources. The SECIs should include an element of active involvement of households, thus avoiding the inclusion of SECIs that purely address energy supply. The definition of a SECI has intentionally been kept broad in order to make room for empirical enquiry, such as a large variety in empirical examples seeking to achieve what can be largely perceived as the same 'goals', for example, of reducing energy use or carbon emissions, or alleviating fuel poverty. Nonetheless, a few guidelines were developed in order to identify what a SECI can be for the purpose of assessing problem framings related to energy demand, and consumption. SECIs included in ENERGISE can include households as actors in a number of different ways. The households may be viewed as consumers (by buying products and services); prosumers (for instance by (co)-producing renewable energy); innovators (by using products in innovative ways creating other/new kinds of energy demand), and/or they can be viewed as active participants in various groups relating to sustainable energy consumption (e.g. through Facebook groups or NGOs). Households may also be investors in sustainable consumption initiatives and renewable energy schemes. Households play different roles depending on the different practices they engage in, thus a number of different roles may be relevant for ENERGISE. SECIs included in ENERGISE are not initiatives that solely deal with reductions in energy demand or carbon emissions within companies or at the energy suppliers themselves, even if those initiatives contribute to reductions in energy use within households as a result of buying the products or services (e.g. oil, gas, electricity, food, ICT, etc.).

With this definition in mind, a large scale review of existing SECIs was undertaken as part of the ENERGISE project in order to explore the objectives, goals and methods of interventions often employed in such initiatives. In the following section, a short description of the methodology developed for making such inquiries is given. The methodology for conducting the review, and the kind of knowledge production that the methodology enables, is described in more detail elsewhere (Jensen et al (forthcoming)).

### 2.2 Assessing and reviewing large scale datasets of SECIs

In order to explore the content, extent and problem framings in recent and existing SECIs, a systematic, criteria-based assessment of a 1000+ SECIs across 30 European countries was carried out. The review was guided by the definition of SECIs provided above, and a methodology for assessing the selected SECIs was developed. The methodology enabled an assessment of SECIs in terms of details about their scope, aims, methods and outputs. A comprehensive database was developed, which comprises a multifaceted overview of the vast variety in scopes, scales, objectives, types and methods of interventions and outputs of SECIs across Europe. In order to undertake this identification and assessment of the SECIs, a database template was developed through which specific aspects of each SECI could be explored and described. In total, 30 categories were defined and included in the finalized template for data collection. The methodological categories, and the knowledge they help produce, are presented in more detail elsewhere (Jensen et al (forthcoming). To provide a few examples, categories were defined to explore the SECIs in terms of whether, and if so, how, they take social practices as targets for intervention for sustainability, rather than individual behavior, 'choice', or technical innovation alone (Shove, 2010; Spurling et al., 2013; Shove and Walker, 2014). Further categories were developed to make inquiries about scale, stated objectives, methods of evaluation, and types of outputs. Thus, the database enables a multifaceted exploration of the 'problem framings' within which actors (including initiators, partners, funders, etc.) in the SECIs might operate.

## 3. Typologising Sustainable Energy Consumption Initiatives

Generalising (qualitative) data must correspond to particular questions and concerns, while 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).

Energy initiatives have been categorized and typologized in other studies, for instance Scepanovic et al (2017) reports on a large review of 'energy initiatives', where they categorize these in correspondence to whether they seem information-based, gamification-based or more structurally oriented. Although the review and assessment they provide is wide-ranging, the classification primarily resonates with prevailing problem framings that tend to understand change in energy consumption as a matter of technological change or change in individual behaviours, even if individual behaviours can be understood as pooled together and 'nudged' in particular social 'contexts' such as through competition. The classification used by Scepanovic et al (2017) supports the claim that energy initiatives are multifaceted, but it also demonstrates the relatively narrow range of problem framings that underpin the 'approaches' they identify.

The conceptual underpinning for the assessment of SECIs identified and analysed as part of ENERGISE enables inquiries about problem framings in order to explicate in what way energy initiatives and sustainable energy consumption initiatives (SECIs) either reproduce or challenge prevailing problem framings. Developing corresponding typologies of problem framings within sustainable energy consumption initiatives (SECIs) is therefore closely related to what questions and concerns the typologies should help address and explore. The questions and concerns are many and multifaceted, and focusing on particular areas of concern will exclude focusing on others. The goal here is to develop typologies of SECIs that highlight the differences in *approaches* to sustainable energy consumption across the analysed initiatives.

This includes highlighting what the SECI takes to be the type-, medium and target of change (consult Jensen et al (fortcoming) for details) both in relation to understandings of how and where change can or should come about, and in relation to the way that energy consumption is approached as 'resource consumption'.

Just as typologies or generalizations should not be 'universalizing', generalizing should also not produce stable representations, but rather representations characterized by contingency and instability (Halkier 2011). The typology, presented in the following sections, is therefore *representing* types of approaches that are (seemingly) *reproduced* in the analysed SECIs. This means that the approaches reported on should be regarded as neither static nor unchangeable, but as captured (in present time and space) for the purpose of analysis.

## 3.1 Exploring Problem Framings in sustainable energy consumption initiatives

As the main interest of the presented research is to explore in what ways sustainable energy consumption challenges are understood, framed and addressed, the typological interest is to understand embedded problem framings. The Problem Framing Typology is developed based on particular conceptual inspiration from Spurling et al's (2013) definition of various problem framings of the sustainability challenge, and with inspiration from recommendations for behaviour change initiatives as proposed by Southerton et al (2011). The typology seeks to classify SECIs according to what appears the predominant problem framing utilised of the challenge of obtaining sustainable energy consumption.

Spurling et al (2013) propose six different problem framings of the sustainable challenge, where three resemble predominant problem framings in much consumer policy, and three resemble framings that draw on a practice perspective (Table 1).

*Table 1 Problem framings - adapted from Spurling et al 2013*

| Problem Framing | Target of Intervention |
|---|---|
| | |
| **1. Innovating technology** | Reduce the resource intensity of existing patterns of consumption through technical innovation and optimization |
| **2. Shifting Consumer Choices** | Encourage consumers to choose more sustainable or energy efficient products |
| **3. Changing Behaviour** | More broadly, encourage individuals to adopt more sustainable behaviours and discourage them from less sustainable behaviours. |
| | |
| **4. Re-crafting Practices** | Reduce the resource intensity of existing practices through changing the components which make up those practices (meanings, skills and materials) |
| **5. Substituting Practices** | Replace less sustainable practices with more sustainable alternatives, with an eye to how alternative practices can fulfil similar purposes |
| **6. Changing how Practices Interlock** | Social practices interlock with each other - for example: mobility, shopping and eating. Changing the way they interlock means exploring and harnessing the complex interactions between practices, so that |

change ripples through interconnected practices.

The units of analyses and intervention for the framings drawing on a practice perspective, includes, but also moves beyond, traditional mechanisms that are employed in most behaviour change initiatives.

Southerton et al (2011) proposes that mechanisms employed in behaviour change initiatives tend to address one, and sometimes more, context in which behaviour might be changed; 1) the Individual, which refers to focusing on influencing the attitudes, behaviours and choices of the individual consumer, 2) the social, which refers to paying attention to social norms, cultural conventions and shared understandings of consumer practices, and 3) the material, which refers to the objects, technologies and infrastructures that both enable and constrain ways of behaving. In their international review, Southerton et al (2011) find that behavior change initiatives that target multiple contexts, multiple moments of lifestyle transitions, and institutional or infrastructural pressure points are more likely to be successful. Equally they find that there is untapped potential in exploring opportunities for developing frameworks for coordinated initiatives across sectors and systems. Finally they find that utilizing mechanisms that changes provision and goods, and not necessarily 'behaviours', such as switching to renewable energy sources, as well as 'non-environmental' issues such as health, diet and time management appear to promote 'pro-environmental' behaviours.

Spurling et al (2013) argues that problem framings that draw on a practice perspective "moves beyond individual behaviour on the one hand and its context on the other —whether material infrastructure or social norms—to a unit of analysis that integrates both behaviours and their material, social and cultural contexts" (p 19). Problem Framings that draw on a practice perspective would thus ideally regard spaces and mediums of intervention as the social, cultural and material underpinning of behaviours. This implies that individual behaviours are not in themselves treated as the target of intervention, but rather that the practices that organizes everyday life and society in particular ways are targeted. This means that a practice based problem framing would ideally deconstruct and combine several of the elements in behaviour change programmes and interventions that Southerton et al (2011) identify.

That said, taking inspiration from some of the mechanisms that are used to target the various 'contexts of behaviours' as proposed by Southerton et al (2011) may be useful in order to assess and discuss *how* to utilize a combination of these when targeting the practices. Taking point of departure in these conceptual ideas, the database of the 1000+ European SECIs has been categorized accordingly, and four different categories for problem framings in existing SECIs were established. These categories are presented and exemplified in the following section.

## 4. Types and prevalence of Problem Framings in sustainable energy consumption initiatives (SECIs) across Europe

The Problem Framing Typology presented in this section consists of four different categories under which a SECI can be classified, depending on the seemingly predominant problem framing approach that the SECI (re)produces. The categories correspond to the analytical interest underpinning the review and assessment of the database of the 1000+ SECIs, as well as the empirical data from the SECIs reviewed. In the following, each problem framing category is described and, for each category, a typical example is provided for

illustration. The succeeding section presents the number of SECIs from the database that fall under each category.

### *CHANGES IN TECHNOLOGY*

This problem framing assumes that changing levels in energy use is a matter of technological change. It is often assumed that technological change will happen in the context of social stasis, and therefore people or practices are rarely included as active agents for change. The main goal is to reduce energy consumption levels through technological innovation, be it innovation in products and household appliances or larger scale transformations of the energy system, such as going from fossil to renewable energy sources.

SECIs that are classified under this category often entail the following characteristics:

- Sustainable energy consumption is seen as a matter of technological change through optimization and efficiency.
- The social organization of everyday life is never or rarely included in the objectives or targets of intervention. Social changes may happen due to technological changes, but will be 'unintended consequences'.
- Methods of interventions are often information, feedback, monetary incentives, energy inspections, (technological) experimentation and legal requirements.
- Often comparable to conceptualizations such as 'Innovating technology' in Spurling et al (2013) and draws on mechanism that resembles the mechanisms put forward in the 'material context' as defined by Southerton et al (2011).

The category, and the SECIs that fall under this category, range from optimization of household products to developing new and energy efficient buildings. In all instances, technological or product optimization is seen as the main driver for change towards sustainable energy consumption. The basis of everyday life and practices, such as cooking, dining and showering, which all generates certain levels of energy consumption, are not challenged. If people are included as an active agent in change process, this problem framing will often see change as a matter of changes in individual behavior, which is closely related to the next category.

A typical example of a SECI underpinned by this problem framing would be if energy consumption related to the storing and preparing of food solely (or at least primarily) is understood to be a matter of optimizing kitchen appliances. This could also include a focus on providing technical labelling for various appliances so that the 'consumer' can easily navigate between them in terms of energy efficiency. SECIs like these would however not explicitly challenge the number of appliances used or the role that these play in the configuration of everyday life related to food preparation. Neither would SECIs within this category explicitly challenge what is understood to be 'proper meals' in different contexts and situations.

### *CHANGES IN INDIVIDUALS BEHAVIOUR*

This problem framing assumes that changing levels of energy use is a matter of changing individuals' behaviour in terms their (personal) energy use. This can be done through different mechanisms such as social marketing or nudging, encouraging individuals to adopt more sustainable behaviour. Behaviours are in this problem framing often understood as comprised of attitudes, choices and motivation and will change when under pressure from external factors. Essential from this problem framing is that it (often) assumes autonomy of individual choice. The problem framing thus targets individuals, often as 'consumers'.

SECIs that are classified under this category often entail the following characteristics;

- Sustainable energy consumption is seen as a matter of adopting sustainable behaviour. The SECIs in this category often assume that change towards sustainability is a matter of individuals changing behaviour by changing attitudes and choosing sustainable products.
- Social norms might be considered as *contexts* of behaviour change, but social norms in themselves are rarely challenged and experimented with.
- An adoption of the same rationales of the category Changes in Technology and Products. However, instead of relying on technological changes alone, SECIs in this category adds other measures such as campaigning for more energy efficient versions of certain behaviours. Some SECIs may use education as a means for change, but often treats education as knowledge that is acquired/transferred 'as is', more than something that needs to be learned and performed.
- SECIs within this category often 'black-boxes' its goals and intentions as 'objective'. This includes an assumption that the knowledge and policies that the SECI draws on for its problem framing of change are not normatively loaded/guided themselves, and that sustainable behaviour initiatives are 'external' to what is being changed and can thus be 'implemented'.
- Methods of interventions are often (tailored) information, campaigns, training, education, some forms of peer to peer learning and monetary incentives
- Often comparable to conceptualizations such as 'Shifting consumer choices' and 'Changing Behaviour' in Spurling et al (2013), and draws on mechanisms that resembles the mechanisms put forward in the 'individual context' and the 'social context' as defined by Southerton et al (2011).

The category, and the SECIs that fall under this category, range from providing information about opportunities for selecting energy efficient products to adopting more energy efficient lifestyles.

SECIs targeting food related energy consumption, underpinned by this problem framing, might go a bit further than relying on energy efficiency labelling of products, by providing more information about why it is good for the consumer to choose the most energy efficient product. Information provided may focus on monetary incentives or it may address ecological consequences of not choosing the most energy efficient option. It does however not challenge the amount of products used, why these products are used in the first place, or what 'a proper meal' is understood to be in different contexts and situations.

Common to both approaches is that the *individual* is put forward as the target for change, and that the 'responsibility' for change lies with the individual (Shove, 2010). Shove (2010) classifies this approach as the ABC model, and argues that this way of allocating responsibility with the individual (consumer) is exactly why it has gained much popularity in policy-related reports and models for (sustainability) change.

Importantly, the two problem framings presented above can produce changes in practices as a result of their efforts, but these changes are often unintended, and may often result in rebound effects or other shifts in consumption patterns (see Cool Bizz example in Shove 2014). Avoiding (negative) unintended consequences require that problem framing and related representations of change to a larger extent recognizes the social embeddedness of practices across systems and domains (Sahakian and Dobigny, 2017), whilst opening up the 'space' for intervention and allowing for change strategies to be reflexive (Voss and Kemp, 2006) enough to welcome changes in the strategy itself as the change processes unfolds.

The below two categories represent aspects of how such a process can take place.

### *CHANGES IN EVERYDAY LIFE SITUATIONS*

This problem framing assumes that changing levels of energy use is a matter of changing material components, images/norms and competences related to specific areas of daily life. This can be done by exploring and understanding what people use energy for (Shove and Walker, 2014), and targeting what

energy is used for rather than targeting energy consumption as a value in itself. The use of water, heating and energy is seen and understood as a result of 'everyday life situations'. Although people are seen as active agents in change processes, it is the everyday life situations that are targeted and sometimes challenged, and peoples behaviours are regarded (collectively) as a result of/dependent on everyday life dynamics.

SECIs that are classified under this category often entail the following characteristics;

- Targeting what energy and heating is used for, and not energy and heating in itself. This is however often done without explicitly considering connections between activities and situations that are not directly observed as co-dependent. Therefore if cooking or dining situations are targeted, they might be targeted as singular instances that are not deeply dependent on the synchronization and timing of several aspects of the everyday life and society in general.
- Social, material and habitual aspects of everyday life situations appear to be targeted and experimented with.
- Often emphasizes social/collective aspects of methods of intervention, and could include participatory methods, such as some forms of peer-to-peer learning, collaboration, living labs, training, experiments and a community focus. When information campaigns are a method of intervention, it is often (if not always) combined with other kinds of methods of interventions.
- Often comparable to conceptualizations such as 'substituting practices' or 'recrafting practices' in Spurling et al (2013), and draws on several of the mechanisms put forward within and across 'contexts' as defined by Southerton et al (2011). *However, and importantly, SECIs that are classified under this category, would not treat individual, social and material aspects of change as 'contexts' for behaviour, but rather as (important) 'constituents' of behaviours.*

The category, and the SECIs that fall under this category, range from acknowledging everyday life and its organization as a constituent for energy use and consumption in the design of the intervention, to experimenting with and challenging various kinds of everyday situations, such as cooking and driving (moving around). Common for all parts of the scale within this category is that it appears that everyday life situations, and not only behaviours, are the target of intervention, and it seems that it is acknowledged that everyday life is comprised of practices that reproduce particular configurations of materials, skills and meanings related to cooking, showering, shopping, driving, etc.

SECIs that seeks to address food related energy consumption, and which are underpinned by such problem framing, would approach the challenge of energy consumption all together differently than the two previously described problem framings. Here, the situations of everyday life that seem to have an implication for the way that food is stored and prepared would be the 'unit' of interventions. SECIs would address the situation of 'making dinner' and aim to facilitate a process of thinking and acting differently in relation to the way food is bought, stored and prepared. This could for instance be to co-develop cookbooks for meals that are less resource intensive (e.g. vegetarian meals). It could also be to enable shared spaces for cooking and eating. SECIs like these might also challenge the number of appliances used for preparing meals, and it may employ a notion of sufficiency rather than efficiency (see Fahy et al (forthcoming) for details on sufficiency based SECIs).

### *CHANGES IN COMPLEX INTERACTIONS*

This problem framing assumes that changing levels of energy use is a matter of changing complex interactions between several areas of household related activities, professions and sectors. This includes assuming that 'social organization' is the key target for change, and that water, heat and energy consumption happens because of certain ways of organizing daily life across domains, sectors and

practices. This category is broader than the previous category 'changes in everyday life' as it goes beyond exploring and targeting what happens within a home, to include targeting relations to particular systems of provision, be it product-service systems, utilities, construction sites, banks and work places.

SECIs that are classified under this category often entail the following characteristics;

- Multiple actors in and across several sectors as well as practices are involved.
- The space of intervention opportunities is 'bigger', more complex and involves several measures taken.
- Unlike the problem framing 'Changes in individuals behaviours', the 'responsibility' for change seem to be seen as shared between multiple actors from different 'domains' of society (businesses, utilities, residents, and policymakers to some extent).
- Often includes (several) methods of interventions such as training, education, new business models, experimentation, and community building. SECIs in this category often consist of several initiatives, or are part of an umbrella of other initiatives.
- SECIs within this category ideally have a more 'reflexive' (e.g. Voss and Kemp, 2006) understanding of the knowledge and policies that it draws on, and change is seen as a process of emergence and knowledge production that happens between all actors involved in the initiative/change process. In other words, change agents/actors are not perceived to be 'outside' of what is being changed, but rather a (dynamic) part of it.
- Often comparable with conceptualizations such as 'changing the way practices interlock' in Spurling et al (2013) and draws on several of the mechanisms put forward within and across 'contexts' as defined by Southerton et al (2011). *However, and importantly, SECIs that are classified under this category, would not treat individual, social and material aspects of change as 'contexts' for behaviour, but rather as (important) 'constituents' of behaviours*.

The category, and the SECIs that fall under this category, range from focusing on changing configurations of existing energy demands to enabling new forms of engagements with renewable energy and visions of sufficiency. Common for them all is that multiple actors are involved and varies ways of organizing society in terms of energy provision and consumption appears to be challenged.

SECIs that target food related energy consumption, and which are underpinned by this problem framing, focus on enabling less resource intensive meals (i.e. eating less meat), including challenging the way that food is produced. It may argue for (or ideally even enable) political and legislative changes in terms of how food is produced. SECIs would target a wider range of actors, challenge existing ways of organizing everyday life around buying, storing and preparing food, and co-design new networks for buying locally (and maybe package-free), shared storage spaces and potentially communal dining. Eco-communities often resemble such attempts, by socially and materially organising different ways for storing and preparing food, which enable people to engage in alternative food related practices.

The table presented below sums up each category in the PFT, and provides a few specific examples of SECIs that have been categorised under each category.

*Table 2 Overview of Problem Framing Typology Categories with examples*

| Category | Description | Example | Number of assessed SECIs within this category |
|---|---|---|---|
| Changes in technologies | This problem framing assumes that | Optimizing existing | **282 SECIs out of a total** |

| | | | |
|---|---|---|---|
| and products | changing levels in energy use is a matter of technological change | products so they become more energy efficient; technical innovation; focusing on large-scale technical changes from fossil fuel to renewable energy | **of 1067**<br><br>Examples of SECIs from ENERGISE Database:<br><br>iBroad;<br>Frigoslag;<br>Top Produkte |
| Changes in individual behaviour | This problem framing assumes that changing levels of energy use is a matter of changing individuals' behaviour in terms their (personal) energy use, and their attitudes and choices related to energy efficiency | Information campaigns or nudging approaches that seeks to convince the individual about rational use of energy, or to adopt more energy efficient lifestyles. | **514 SECIs out of a total of 1067**<br><br>Examples of SECIs from ENERGISE Database:<br><br>EnerGbg;<br>Campaign promoting sustainable lifestyles;<br>SAVE-E |
| Changes in everyday life situations | This problem framing assumes that changing levels of energy use is a matter of changing material components, images/norms and competences related to specific areas of daily life. | Understanding, challenging, engaging with and enabling (new) meanings, skills and material arrangements related to various everyday life situations. These can be connected to practices such as cooking and showering. | **124 SECIs out of a total of 1067**<br><br>Examples of SECIs from ENERGISE Database:<br><br>B.L.E.D;<br>Kreative Restkuecke;<br>Kierrãtyskeskus, 4V |
| Changes in complex interactions | This problem framing assumes that changing levels of energy use is a matter of changing complex interactions between several areas of household related activities, professions and sectors. This includes assuming that 'social organization' is the key target for change, and that water, heat and energy consumption happens because of certain ways of organizing daily life across domains, sectors and practices. | Targeting systems of energy provision, configurations of energy demand, including various actors involved in (re) procuring certain dynamics of existing or new systems of production and consumption. | **147 SECIs out of a total of 1067**<br><br>Examples of SECIs from ENERGISE Database:<br><br>City of energy – Société 2000 watts;<br>Granollers en Transició;<br>Energiesuffizienz |

## Dominant problem framings in current sustainable energy consumption initiatives

Each of the 1067 SECIs were analysed and coded in accordance to the process elaborated on above (Table 3). Strikingly, but maybe not surprisingly, the number of SECIs categorised as 'Changes in Everyday Life Situations' and 'Changes in Complex Interactions' are few, where as the majority of SECIs can be categorized under 'Changes in Technology' as well as 'Changes in Individuals Behaviour'. This result aligns

with current critiques, indicating the dominant focus on individual behaviour change programmes (e.g. Shove, 2010) and energy efficiency schemes (e.g. Shove, 2017).

*Table 3 Overview of resulting share of problem framings.*[3]

| Sustainable consumption category | No. initiatives | % of total initiatives |
|---|---|---|
| Sustainable Energy Consumption Initiative | 1067 | 100 |
| Change as Change in Complex Interactions | 147 | 13.7 |
| Change as changes in Everyday Life Situations | 124 | 11.7 |
| Change as changes in Individual Behaviour | 514 | 48.2 |
| Change as Changes in Technology | 282 | 26.4 |

## 5. Concluding remarks: Implications for energy policy and perspectives for future research

This paper has reported on the findings from a large-scale review of existing SECIs carried out across Europe. The review has focused on exploring the content, scope and scale of the SECIs to interrogate the way energy consumption is considered a challenge in the SECIs. The way that energy consumption is understood as a challenge is closely related to the underpinning problem framing of the SECI.

The findings from the review show that at least 75% of existing SECIs understand energy consumption as a matter primarily of changes in technology or as changes in individual behaviours. The responsibility for change is therefore primarily allocated to that of technological performance or on the individual as 'consumer'. This is concerning for several reasons. First, these assumptions disregard any potential negative changes happening due to technological changes, which often include so-called rebound effects as well as increases in resource intensive activities (Labanca and Bertouldi, 2018), such as more time or money to do other (resource intensive) things. Shove (2017) argues that related, often counter-productive, results of energy efficient improvement strategies are due to the fact that the ways of thinking about energy efficiency are themselves 'performative' and that they end up perpetuating meanings and levels of services related to existing (unsustainable) types and patterns of consumption, rather than effectively challenging them.

Second, it thus seems worth to pay attention to how the remaining 25% of the SECIs reviewed appear to take on a different approach to energy consumption, by treating it as a matter of everyday life situations and changes in complex material and social interactions of society. Notably, several of these SECIs seem to regard changes in energy consumption levels as a matter of understanding what is 'sufficient' rather than 'efficient' (Fahy et al (forthcoming)).This aspect is underresearched and requires more attention.

[3] It is important to note that the typologized SECIs have been categorized as a result of a collaborative approach within the ENERGISE consortium. However, the ENERGISE consortium recognizes that the typologisation of the SECI can be subject to change, if actors from identified SECIs objects to the category within which they have been placed. In our Open Access Database (http://energise-project.eu/projects) all 1000+ SECIs that have been reviewed and classified can be found, and actors from all identified SECIs are encouraged to get in touch and engage in debate about problem framings of the sustainability challenge.

Although these findings provide an interesting case of the need for challenging predominant types of problem framings within (local) energy policy, the review does not provide much information about a number of related issues that also warrant further research. However a few reflections on some of these shortcomings are described below, as the findings as well as the shortcomings provide relevant and critical implications for policy.

First of all, the review provides little information about to what extent reductions in energy use and/or $CO_2$ emissions have been obtained. This is for several reasons. Some SECIs provided no information on outputs, and the ones that did were often not explicit about the units within which the outputs were measured. Evaluation schemes are closely connected to the problem framings within which the initiative has been carried out, and thus outputs are reported on in various ways (if at all), such as in monetary terms, or relational, efficiency terms (a 10% reduction, but with no reference to what it is a 10% reduction of). Only very few initiatives set out to reach absolute reductions, for example 'Society of energy – Societé 2000 watts', and thus reports on outputs in absolute terms.

Second, the results of the review does not only reflect 'intentional' and explicitly addressed ideas about change, but also a number of vested interests, such as sunk investments, infrastructural conditions established by others than SECI initiators and directly involved actors, prevailing ideas about capitalism and so on. Changing perspectives on how energy consumption comprise a problem for society and the environment means challenging the way that nature and the environment is valuated in political and economic perspectives.

Third, understanding changes in energy consumption as a matter of changes in everyday life situations and complex social and material interactions in society means taking seriously that policy neither can nor should aspire to 'silver bullet solutions'. Society and 'everyday life' is different across countries and even within countries.

Researching existing SECIs that resonates with problem framings that take into account everyday life and societal dynamics may provide useful insights into how energy consumption levels can be challenged practically for particular places at particular points in time. It may be particularly interesting to explore in more detail SECIs that seem to challenge existing regulations (that are underpinned by prevailing technological or behaviourally oriented problem framings) and which may be counter-productive or even obstructive for SECIs that builds on problem framings that draw on what could resemble a practice-perspective.

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