ENERGISE

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

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DELIVERABLE 2.4

CONSTRUCTIONS OF TYPOLOGIES OF SUSTAINABLE ENERGY CONSUMPTION INITIATIVES (SECIs)

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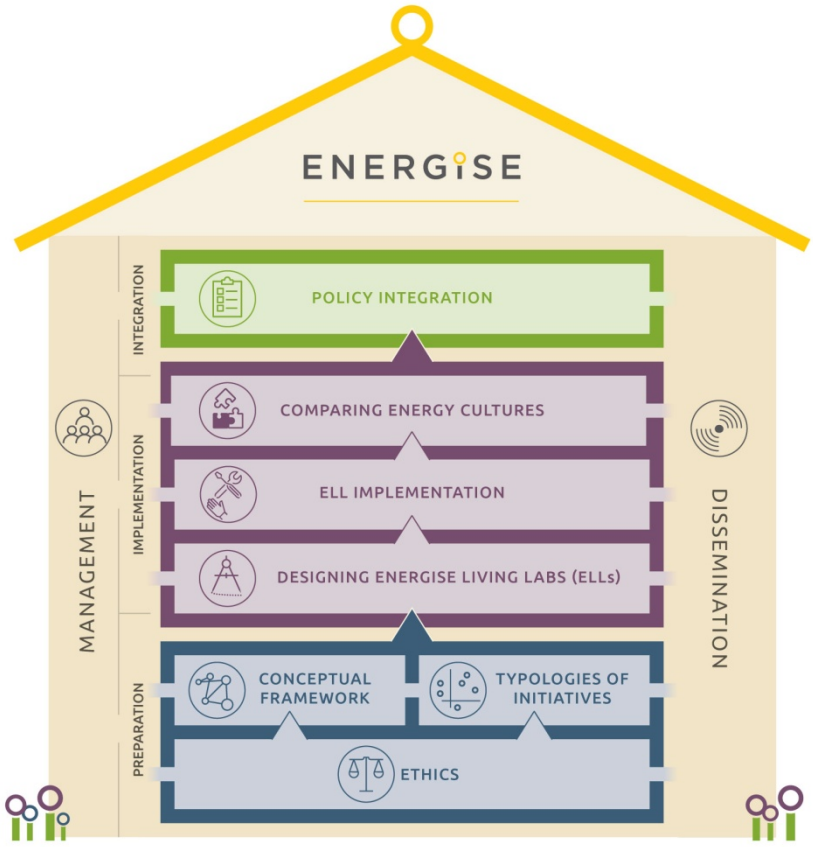
ENERGISE PROJECT

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

- **Develop an innovative framework** to evaluate energy initiatives, taking into account existing social practices and cultures that affect energy consumption.
- **Assess and compare the impact** of European energy consumption reduction initiatives.
- **Advance the use of Living Lab approaches** for researching and transforming energy cultures.
- **Produce new research-led insights** into the role of household routines and changes to those routines towards more sustainable energy.
- **Encourage positive interaction** between actors from society, the policy arena and industry.
- **Effectively transfer** project outputs towards the implementation of the European Energy Union.



EXECUTIVE SUMMARY

This document (ENERGISE D2.4) provides a background report of the process of constructing typologies of Sustainable Energy Consumption Initiatives (SECIs) as part of WP2 of the ENERGISE Project. As part of Task 2.3 and Task 2.4 in WP2 of ENERGISE, the goal was to construct typologies that explore and highlight aspects of, and differences in, *approaches* to sustainable energy consumption. This includes the differences in the ways that changes in energy use are expected to come about within the 1067 SECIs identified in D2.1. Two main typologies have been developed for this purpose; the Problem Framing Typology (PFT), which is inspired by Spurling et al (2013)'s discussion of policy approaches to consumer behaviour, and the Resource Consumption Typology (RCT) which is inspired by the four layers of the Resource Consumption Hierarchy (RCH); buying green products, repairing, sharing and "back to basics" (SCORAI, 2015). A summary of both typologies and their categories can be seen below:

THE PROBLEM FRAMING TYPOLOGY (PFT)

Category	Description	Example	SECI Example
Changes in technology	This problem framing assumes that changing levels in energy use is primarily a matter of technological change	Optimizing existing products so they become more energy efficient; technical innovation; focusing on large-scale technical changes from fossil fuel to renewable energy	iBroad; Frigoslag; Top Produkte
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, 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.	EnerGbg; Campaign promoting sustainable lifestyles; 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.	B.L.E.D; Kreative Restkuecke; 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; various actors involved in (re) procuring certain dynamics of production and consumption, promoting collaboration rather than competition	City of energy – Société 2000 watts; Granollers en Transició; Energiesuffizienz

THE RESOURCE CONSUMPTION TYPOLOGY (RCT)

Category	Description	Example	SECI example
Sufficiency	Limiting what is produced and consumed in absolute terms	Eco-communities; Initiatives that limit energy use to a defined level	El Valle de Sensaciones; On débranche - national research project; Wir leben 2000 Watt
Efficiency	Reducing the ratio between value created and resources used or impact created	Using greener products and changing behaviour	Program for Ignalina "Energy efficiency improvement in buildings"; REMODECE; SAVE project
Efficiency-Reduction	Reducing energy used or emissions generated	Turning down thermostats; unplugging dormant appliances; Insulating attics and walls	START2ACT; Bye, bye Stand-by!; SAVES2: Students Achieving Valuable Energy Savings 2
Efficiency-Substitution	Substitution of more harmful products with less harmful products	Replace inefficient lighting with LEDs; purchasing energy efficient appliances; Switching to electric vehicles; using bicycle instead of car	Solar checks; Top quality energy efficient lighting for the domestic sector (PREMIUMLIGHT); Top Ten website
Sharing/Repairing	Initiatives that have characteristics of both sufficiency and efficiency - Context dependent	Car sharing; sharing appliances; repairing products	Pumpipumpe; Aha!Car platform; R.U.S.Z

It is important to note that the typologies developed and presented within this Deliverable (ENERGISE D2.4) are developed to explore and highlight *particular* questions and concerns related to sustainable energy consumption initiatives (SECIs). With different questions and concerns, different sets of typologies can be established. The resulting categorisation of the SECIs is therefore strictly related to the aim of highlighting particular aspects of *approaches* to sustainable energy consumption.

DISCLAIMER

The typologies presented as part of this deliverable (ENERGISE D2.4) reflect the authors' interpretation of the concepts and terms used to construct the typologies. The interpretations of terms such as problem framings, efficiency and sufficiency are therefore the sole responsibility of the authors and do not necessarily reflect the views of all ENERGISE Partners. The typologies and understanding of specific concepts such as energy sufficiency will be subject to on going discussions throughout the remainder of the ENERGISE project.

As part of ENERGISE D2.3, a Public Database displaying the Problem Framing Typology categorisation of all identified SECIs has been developed. If representatives from a SECI do not recognise the category within which the SECI has been allocated, the ENERGISE team invites the representatives to get in touch. The Public Database includes a feature for actors and stakeholders to submit responses to the categorisations.

1 INTRODUCTION TO DELIVERABLE D2.4

This document (ENERGISE D2.4) provides a background report on the process and results of constructing typologies of Sustainable Energy Consumption Initiatives (SECIs), that have been collected and assessed as part of Work Package 2 (WP2) in the ENERGISE project. The full list of SECIs is presented in ENERGISE D2.1 (Jensen et al., 2017). Extensive analyses of the SECIs were carried out in WP2 in order to develop typologies of SECIs. This report presents the analytical process of developing the typologies based on those analyses, as well as the resulting typologies. The *methodology* for collecting and assessing the SECIs is reported in ENERGISE D2.2 (Jensen, 2017).

As part of developing typologies of SECIs, the theoretical and conceptual work developed in ENERGISE WP1 has been utilised to analyse and classify SECIs. The typologies are therefore established with an embedded focus on individual, social and material contexts of SECIs, and they distinguish between individual and collective-level change. The typologies further distinguish between different understandings of resource consumption. The goal of developing typologies of SECIs is to explore and highlight the differences in *approaches* to sustainable energy consumption, including the differences in the way that changes in energy use are expected to come about. Two main typologies have therefore been developed; the Problem Framing Typology (PFT), which is inspired by Spurling et al.'s (2013) discussion of policy approaches to consumer behaviour, and the Resource Consumption Typology (RCT) which is inspired by the four layers of the Resource Consumption Hierarchy (RCH) developed by members of SCORAI Europe; buying green products, repairing, sharing and "back to basics" (SCORAI, 2015).

Before presenting the process of constructing the typologies of SECIs in section 2, as well as the resulting analysis in Section 3, a short introduction to WP2 and its objectives is given below.

1.1 WP2: TYPOLOGIES OF ENERGY INITIATIVES

ENERGISE WP2 is a systematic criteria-guided review and classification of existing sustainable energy consumption initiatives from 30 European countries (EU-28, Switzerland and Norway), made available in a comprehensive European database of energy initiatives involving households, and a subsequent development of typologies of sustainable energy consumption initiatives. This extensive synthesising work guides several phases of ENERGISE, as well as contributes to future energy consumption research, policy and practice.

This is done by:

- Constructing innovative typologies of sustainable energy consumption initiatives that can inform further research and action;

- Identifying key success factors and related indicators, focusing on individual-level, collective, organisational, institutional and societal aspects of energy consumption, which will inform subsequent work packages of the ENERGISE project, in particular WP 3 (Designing ENERGISE Living Labs), WP 4 (ENERGISE Living Labs) and WP 5 (Capturing Energy Cultures);
- Making progress towards the goals of the European Union's Energy Union by creating a publicly archived open access dataset of sustainable energy initiatives across 30 countries in Europe.

1.2 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

1) reducing the actual energy consumption,
2) reducing the emissions intensity of energy consumption (e.g. by substituting fossil fuels with renewable energy sources).

The SECIs included in the database generally feature an element of *active involvement of households*. This is due to the fact that the data collected has to inspire the development of Living Lab approaches involving households. The definition of a SECI is intentionally kept broad in order to make room for empirical enquiry, such as a large variety in empirical examples seeking to achieve the same goals. However, a few guidelines have been developed in order to identify what a SECI *cannot* be as well as what a SECI *can* be.

SECIs collected by the ENERGISE project partners *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.). Initiatives led by companies or energy suppliers that actively target and mobilise households may, however, be included.

SECIs collected by 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. 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, and a number of different roles may be relevant for ENERGISE. Examples of these roles are to what extent and how participants of households (or households as entities) reproduce certain practices

such as heating, cooking or showering. If there are variations in these practices, it is relevant for ENERGISE to capture these variations.

Equally, for the general aims of the ENERGISE project, the differences between individual and collective aspects of initiatives are particularly important. In looking for examples of collective agency in SECIs, initiatives that have been promoted as part of a spatial community or a community of interest have been of importance.

2 CONSTRUCTING TYPOLOGIES OF SECIs

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

Developing typologies of sustainable energy consumption initiatives (SECIs) is therefore closely related to what questions and concerns the typologies should help to address and explore. The questions and concerns are many and multifaceted, and focusing on particular areas of concern will exclude other areas. This also means that typologies are developed to highlight and explore particular analytical concerns. Other typologies would be needed in order to explore and highlight other sets of analytical concerns. As part of Task 2.4 in WP2 of ENERGISE, the goal of developing typologies of SECIs is to highlight the differences in *approaches* to sustainable energy consumption. This includes highlighting the type, medium and target of change in the SECIs (see ENERGISE D2.2 for details (Jensen, 2017)). This is 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 (this includes whether energy consumption is seen as a matter of 'energy efficiency' or 'energy sufficiency' (for elaboration, see section 3.2)).

Just as typologies should not be universalising, typologies should also not produce overly stable representations of social life, as social life is characterised by contingency and instability (Halkier, 2011). In producing typologies, we are inspired by a Weberian approach to ideal types, where types and typologies are heuristic devices for characterising the social world while avoiding strict delimitations (Weber, 1905/2002). An "ideal type" therefore brings together certain characteristics of social life represented by the SECIs, but few SECIs actually take on all of the characteristics defined in a single category. The typologies developed as part of Task 2.4 in WP2 of ENERGISE are therefore representing typical characteristics of particular approaches to change, which appear to be reproduced in the identified SECIs. The characteristics captured are typical, but the problem framings, captured and identified through these categories, should not be regarded as strictly static or unchangeable.

2.1 DEVELOPING TYPOLOGIES

This section will elaborate on the methodology for developing the two typologies; the Problem Framing Typology (PFT) and the Resource Consumption Typology (RCT).

2.1.1 DEVELOPING THE PROBLEM FRAMING TYPOLOGY

A number of different sources of data and inspiration, utilising both inductive and deductive approaches, inform the typology of problem framings.

The Problem Framing Typology (PFT) is inspired by the definition of various kinds of problem framings of the sustainability challenge as presented by Spurling et al. (2013), and by recommendations for behaviour change initiatives as proposed by Southerton et al. (2011). The PFT therefore seeks to classify SECIs according to their main approach to the challenge of obtaining sustainable energy consumption.

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

Table 1 Problem Framings of Sustainability Challenges (adapted from Spurling et al. 2013)

Problem Framing	Target of Intervention
Common framings in current policy	
1. Innovating Technology	Reduce the resource intensity of existing patterns of consumption through technical innovation and optimisation
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.
Framings drawing on a practice perspective	
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, include, but also move beyond, traditional mechanisms that are employed in most behaviour change initiatives.

Southerton et al. (2011) propose that mechanisms employed in behaviour change initiatives tend to address one or (occasionally) more contexts in which behaviour might be changed:

- The individual, which refers to focusing on influencing the attitudes, behaviours and choices of the individual consumer;
- The social, which refers to paying attention to social norms, cultural conventions and shared understandings of consumer practices, and
- The material, which refers to the objects, technologies and infrastructures that both enable and constrain ways of behaving.

Southerton et al. (2011) find, in their review, that behaviour 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 utilising mechanisms that change 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) seem to promote 'pro-environmental' behaviours.

Spurling et al. (2013) argue 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 organise 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 of the behaviour change programmes for 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 utilise a combination of these when targeting practices.

Taking these ideas as point of departure, the typology was further refined by drawing on additional relevant literature, such as ENERGISE D3.2 (Laakso et al. 2017), ENERGISE D1.2 (Rau and Grealis 2017) and ENERGISE D2.2 (Jensen, 2017). Simultaneously, a preliminary analysis of the database of over 1000 SECIs (see Jensen et al. (2017)) was undertaken in order to identify important aspects of the data collected in each SECI (see Jensen 2017)). Several categories were selected as the basis for analyses to inform the Problem Framing Typology. The main categories selected were Descriptions, Objectives, Outputs, Indication of Type of Outputs, Areas of Consumption Targeted, Consumption Change, Medium of Intervention, Type of Change, and Community. These categories were

selected with respect to the analytical concern that this typology is developed to address and explore. Additional categories were used to further explore and qualify assessments (see Jensen 2017 for examples of categories).

A preliminary typology based on the theoretical, conceptual and empirical elements presented above, as well as a corresponding coding of the SECIs, was sent to all ENERGISE Partners for review. The typology was further refined based on the feedback from all partners. A final classification of the 1000+ SECIs was based on feedback from each partner and all partners have been involved in the process of classifying SECIs.

2.1.2 DEVELOPING THE RESOURCE CONSUMPTION TYPOLOGY

As with the development of the Problem Framing Typology, the typology of resource consumption is informed by a number of different sources of data, utilising both inductive and deductive research approaches. First, the typology builds on the Resource Consumption Hierarchy (RCH) (Figure 1) developed by members of SCORAI Europe and included in a position paper submitted to the European Commission in February 2015. A modified version of the RCH also featured in a recent peer-reviewed publication in the journal *Research Policy* (Rau et al., 2017). The RCH describes a conceptual tool to illustrate the scale of resource impact based on different forms of consumption from buying green products (i.e. consuming differently) at the bottom to dramatically reduced consumption at the top. The top two layers require a significant shift in consumption-related practices but also represent the greatest opportunities for environmental gains.

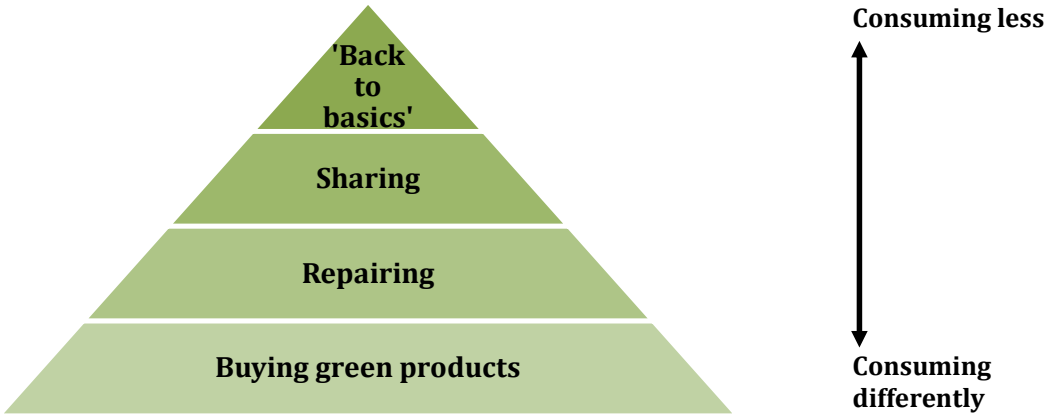


Figure 1 Resource Consumption Hierarchy (SCORAI, 2015)

Next, the typology was refined following a review of the relevant literature as well as the ENERGISE conceptual framework (Rau and Grealis, 2017). This process shifted the focus of the typology from 'consuming less' and 'consuming differently' to better align with

current academic discussions and debates that examine the concepts of sufficiency and efficiency[1].

Finally, a preliminary analysis of the database of over 1000 sustainable energy initiatives (Jensen et al., 2017) was undertaken to identify any additional elements that needed to be considered. Preliminary exploration of the database was fruitful in incorporating practical understandings of sustainable energy initiatives as well as revealing some of the nuances in different sustainable energy strategies. These elements were incorporated into the typology construction and used to inform the subsequent classification.

Initiatives were classified under five categories that together make up the Resource Consumption Typology (RCT). The RCT consists of three broad categories (called "efficiency"; "sufficiency"; "sharing/repairing") and two subcategories under "efficiency", which distinguishes between efficiency as reduction and efficiency as substitution. Initiatives were assigned based on a theoretical understanding of each category and a review of the corresponding information contained in the database for each sustainable energy initiative. Particular database entries that were most relevant included the categories dealing with description, objectives, outputs, and type of consumption change promoted. The latter category prompted researchers to identify if particular initiatives promoted using greener products, using less products, sharing products, repairing products, a mix of these, or some other type of consumption change. Additionally, researchers were asked to provide reference links to supplementary resources such as websites, project reports, media items, etc. These references were perused in many cases as a means of confirming and validating RCT categorisations. Google Translate was used to translate non-English publications, websites and other material where native speakers were not available.

3 TYPOLOGIES OF SECIs

This section presents the two resulting typologies, the Problem Framing Typology (PFT) and the Resource Consumption Typology (RCT), and provides examples of SECIs classified based on the typologies.

3.1 PROBLEM FRAMING TYPOLOGY

The Problem Framing Typology 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 are as follows:

[1] We acknowledge that there are many different interpretations of 'efficiency' and 'sufficiency' in relation to sustainable energy use. The definitions and interpretations of efficiency and sufficiency presented in this Deliverable reflect the authors' interpretation of the terms as applied in this context, and do not necessarily reflect the views of all ENERGISE Partners. The concept of energy sufficiency will be revisited throughout the ENERGISE project.

CHANGES IN TECHNOLOGY

This problem framing assumes that changing levels in energy use associated with particular products, devices, or facilities is primarily a matter of technological change, and not about changing the organisation of daily life. Within this problem framing, it is often assumed that technological change will happen in the context of social stasis, and therefore potential shifts in performances of people or practices are rarely anticipated. 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 transitioning from fossil to renewable energy sources.

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

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

Examples of SECIs that are classified under this category from the ENERGISE Database (see Jensen et al. 2017b for full list of SECIs classified under this category):

Table 2 Examples of SECIs under the category "Changes in Technology"

Name	Description	Objectives
iBROAD	The iBROAD approach is an evolution of Energy Performance Certificate and energy audit systems, aiming to become a real driver for building renovation. The project will analyse and build upon relevant examples in Germany, France and Flanders, to identify the elements, develop an integrated concept, and produce modular tools, suitable for differing national conditions.	Empowering energy auditors and end-users with knowledge and experience of deep renovation in individual buildings, and providing public authorities with real-life studies and analysis, supporting deep renovation, both for individual buildings and as a long-term national strategy, increasing the renovation rate and depth across the EU.

Frigoslag	Campaign to measure current energy use of the fridge and urge the replacement of old fridges and freezers with efficient ones	Making people understand the use of old fridges / freezers and making them aware of (or making them buy) efficient ones – included calculating of time needed to retrieve costs of new one
Top Produkte	This is a website that highlights highly energy efficient household products.	Making households consider environment friendly products

The category, and the examples provided, ranges between the optimisation of household products and developing new and energy efficient buildings, to larger-scale changes in energy distribution (from fossil to renewable sources). In all instances, technological optimisation 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 – all of which generate certain levels of energy consumption, are not specifically challenged. SECIs within this category might focus on informing people about options for choosing and using energy efficient versions of products, or may focus on how to get people to invest in larger scale technological changes such as energy renovations, but change is essentially regarded to be a matter of energy efficiency and a result of technological changes.

CHANGES IN INDIVIDUALS' BEHAVIOUR

This problem framing primarily assumes that changing levels of energy use is a matter of changing individuals' behaviour in terms of their (personal) energy use. This can be done through different mechanisms such as social marketing or nudging, encouraging individuals to adopt more sustainable behaviour through campaigns, community events, informal training, etc., based on the assumption that people can be incited to become "better" consumers, and that such behaviour can be governed (Dubuisson-Quellier 2017, Sahakian and Dobigny, 2017). Behaviours are in this problem framing often understood as comprised of attitudes, choices and motivations. This problem framing (often) assumes autonomy of individual choice in a 'marketplace of possibilities'. The problem framing thus targets individuals, often as 'consumers'.

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

- Sustainable energy consumption is seen as a matter of adopting sustainable behaviour. It is often assumed that change towards sustainability is a matter of individuals changing behaviour by changing attitudes and choosing sustainable products.
- In most cases, norms are used in a descriptive sense, which involves letting people know how they are doing compared to everyone else, leading to gaming and other competitive-based strategies.

- The adoption of similar rationale as those adopted by SECIs in the category Changes in Technologies. However, instead of relying on technological changes alone, SECIs may add or use 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 treat education as knowledge-transferral rather than as a matter of building up new meanings and skills.
- SECIs within this category are rarely explicit about how the problem framings they draw on are normatively loaded/guided themselves. In that way, SECIs within this category tend to position themselves as 'external' to what is being changed, and they can thus be 'implemented'. This relates very much to the assumption that behaviours can be 'governed' (Sahakian and Dobigny, 2017).
- Methods of interventions are often (tailored) information, campaigns, training, education, some forms of peer-to-peer learning and monetary incentives.
- Often comparable to conceptualisations such as 'Shifting consumer choices' and 'Changing Behaviour' in Spurling et al. (2013), and draw on mechanisms resembling those put forward in the 'individual context' and the 'social context' as defined by Southerton et al. (2011).

Examples of SECIs that are classified under this category from the ENERGISE Database are (see Jensen et al 2017b for full list of SECIs under this category)

Table 3 Examples of SECIs under the category Changes in Individuals' Behaviour

Name	Description	Objectives
EnerGbg	This project involves a household electricity calculator that allows for the estimation of energy usage of specific appliances. This project also provides tips and guidelines regarding overall energy efficiency, ways for reducing energy bills and changing energy behaviour, advice on energy efficient construction, labelling, financing models and environmental protection	Sharing tips and advice on energy savings and energy efficient living at home, practical steps for calculating annual electricity consumption and costs and facilitating energy-efficient behaviour
Campaign promoting sustainable lifestyles	The Hungarian Network of Eco-Counselling Offices (KÖTHÁLÓ) implemented a sustainable lifestyles campaign through its nationwide network of counselling offices in 2008-2009 in 30 towns. The campaign had a less specific focus on energy efficiency; instead, it took a more holistic approach. Apart from this specific campaign, KÖTHÁLÓ has numerous publications, local and national campaigns to support households in greening their lifestyles.	Facilitating discussions and actions related to sustainable lifestyles

SAVE-E	SAVE E is a Danish project about how to get homeowners to invest in energy efficiency renovations. There is an analytical component of analysing 'drivers and barriers', and an experimental/design component of trying out different models	Lowering energy consumption and promoting energy renovations, by analysing and addressing drivers and barriers for individuals and households to invest in energy renovations.

The category, and the examples provided, range between providing information about opportunities for selecting energy efficient products to adopting more energy efficient lifestyles. Common to all examples within this range 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, critiquing the notion that influencing Attitudes would lead to Behaviour change and different Choices, and argues that this model's way of allocating responsibility to 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 (positive or negative) shifts in consumption patterns (Sahakian 2010, Jensen 2017b). To better avoid (negative) unintended consequences, problem framings and related representations of change may to a larger extent recognise the social embeddedness of practices across systems and domains (Jensen 2017b, Sahakian and Dobigny, 2017). This includes 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 following two categories represent aspects of how such a process can take place.

CHANGES IN EVERDAY 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 thus targeting what energy is used for rather than targeting energy consumption in itself. Within this category, 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 people's behaviours are regarded as a result of/dependent on everyday life dynamics.

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

- Targeting what energy and heating is used for, and not energy and heating in itself. However, this is 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 synchronisation and timing of several aspects of the everyday life and society in general.

- Social, material and habitual aspects of everyday life situations appear targeted and experimented with.
- Often emphasises 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 conceptualisations such as 'substituting practices' or 're-crafting 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 simply as the 'environment' in which behaviours take places, but as elements that constitute behaviours.*

Examples of SECIs that are classified under this category from the ENERGISE Database are (see Jensen et al. 2017b for full list of SECIs under this category):

Table 4 Examples of SECIs under the category Changes in Everyday Life Situations

Name	Description	Objectives
B.L.E.D	B.L.E.D. (Berchem Local et Durable) is a project about sustainable urban neighbourhoods. Each neighbourhood has its own dynamic, but all of them, on a territorial scale, try to meet several challenges: reducing waste, preserving biodiversity in the city, reducing the use of cars, promoting a healthier diet, and to reclaim public spaces	Encouraging collective learning, social connections, economic and social assistance in terms of sustainable urban neighbourhoods. Improving quality of life.
Kreative Restküche	This is an initiative that gives inspiration on how to cook with left-overs	Reducing the amount of waste generated from cooking

Kierrãtyskeskus, 4V	The aim of the project was to promote an environmentally friendly way of life and community solidarity, and to provide the residents more opportunities to influence the development of their own living environment. The project supported residents' opportunities to select projects and participate in improving their living environment and promoted education for sustainable development in schools and day-care centres. Models for sustainable urban living and community solidarity were developed in cooperation with the tenant boards of the city-owned rental houses. Several actors (tenants, providers of public services, NGOs) were involved and the project took its point of departure in the needs of the involved actors.	Changing the ways people consume - challenging the way everyday life is organized, challenging images and skills of particular practices.

The category, and the examples provided, ranges from acknowledging everyday life and its organisation as a constituent for energy use and consumption, to experimenting with and challenging various kinds of everyday situations, such as cooking and driving (moving around). Common for all aspects of the range within this category is that everyday life is the target of intervention, and it appears 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.

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 organisation’ is the key target for change, and that water, heat and energy consumption happens because of certain ways of organising daily life across domains, sectors and practices.

This category is broader than the previous category ‘changes in everyday life situations’ 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 elements;

- Multiple actors in and across several sectors are involved
- Actors representing various kinds of practices appear to be 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 appears 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' (see 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 conceptualisations 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 simply as the 'environment' in which behaviours take places, but as elements that constitute behaviours*.

Examples of SECIs that are classified under this category from the ENERGISE Database are (see Jensen et al. 2017b for full list of SECIs under this category):

Table 5 Examples of SECIs under the category Changes in Complex Interactions

Name	Description	Objectives
City of energy – Société 2000 watts	As part of the 2000 watt society, a Swiss initiative to provide an upper limit to energy consumption, 412 cities in Switzerland have taken on the challenge to promote reducing energy consumption and investments in renewables. Members benefit from free technical advice, seminars where they can exchange experiences, information on communal energy policies, and financial support for energy-related projects.	Creating a 'virtual representation of the negawatt city', to quantify, spatialise and mutualise energy and CO_2 reduction-related economies, at the scale of a city.
Granollers en Transició	The initiative began in 2013 with a group of people who wanted to avoid consumption. They have learned from other successful Transition Towns but are also paving their own way by creating a backcasting plan for where they see themselves in 15 years.	Transition to a post-fossil fuel future

Energiesuffizienz	This initiative focuses on understanding the needs and opportunities for technical, systemic and cultural transformations of current forms of energy demand. The project seeks to develop strategies and tools for energy sufficiency.	Identifying and enabling possibilities for technical, systemic and cultural transformations of energy demand.

This category, and the examples provided, ranges from focusing on changing configurations of existing energy demands to enabling new forms of engagements with renewable energy and visions of sufficiency. Common for all of them is that multiple actors are involved and various ways of organising society in terms of energy provision and consumption appear challenged.

The table below summarises each category in the PFT and provides a few descriptive examples, as well as summing up the SECI examples. It is important to note that the categories for this typology resemble 'ideal types', which means that they represent particular, typical characteristics of each problem framing. SECIs might combine elements form different problem framings, particularly between problem framings such as "Changes in Technology" and "Changes in Individuals Behaviours", and between problem framings such as "Changes in Everyday Life Situations" and "Changes in Complex Interactions". The categories are therefore not clear-cut.

Table 6 Overview of Problem Framing Typology Categories with examples

Category	Description	Example	SECI Example
Changes in technology	This problem framing assumes that changing levels in energy use is primarily a matter of technological change	Optimizing existing products so they become more energy efficient; technical innovation; focusing on large-scale technical changes from fossil fuel to renewable energy	iBroad; Frigoslag; Top Produkte
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, 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.	EnerGbg; Campaign promoting sustainable lifestyles; SAVE-E
Changes in everyday	This problem framing assumes that	Understanding,	B.L.E.D;

life situations	changing levels of energy use is a matter of changing material components, images/norms and competences related to specific areas of daily life.	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.	Kreative Restkuecke; 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; various actors involved in (re) procuring certain dynamics of production and consumption, promoting collaboration rather than competition	City of energy – Société 2000 watts; Granollers en Transició; Energiesuffizienz

3.2 RESOURCE CONSUMPTION TYPOLOGY

The Resource Consumption Typology consists of three overall categories, one of which is divided into two subcategories. An SECI can be classified within one or more of the categories depending on the SECIs objectives. This will be described in more detail in the following sections. The categories are as follows:

SUFFICIENCY

Sufficiency is primarily concerned with the reduction of energy use and limiting what is produced and consumed without having a disproportionately negative impact on 'well-being' (Simadi et al., 2017). Therefore, sufficiency approaches target a fundamental change in energy-related social practices (Thomas et al., 2017). There are on-going debates as to what level of energy use is sufficient to live a 'good life', and who should be involved in deciding what this constitutes. We view sufficiency as efforts to reduce energy use to a determined maximum level, or to limit energy use to a defined amount (Figge et al., 2014; Spengler, 2016). Therefore, a general reduction (or indeed increase) in energy use cannot be defined as a sufficiency approach unless it is anchored to a reference point. This distinction is key in how we differentiate between sufficiency and energy reduction.

Without such a reference point, the outcome of the energy reduction becomes somewhat arbitrary. This is because a reduction of, for example, 10% in energy use is not the same for all households. If we consider two identical neighbouring households (in terms of composition and infrastructure) A and B, where A uses double the amount of energy as B, a reduction of 10% in energy use across the two households is not equal. Nor can we conclude that both households have limited energy use to a level that could be considered sufficiency, as energy use in household A remains far higher than the identical household B. In this case, one of three scenarios are likely to be at play: household A consumes more energy than what is sufficient to live a good life; household B uses less energy than what is sufficient to live a good life; household A and B have different interpretations of what constitutes a 'good life' and the amount of energy use that this required to support it. Two further possible outcomes are that both households A and B continue to use less or more energy than what is considered to be sufficient.

We categorised initiatives that target a reduction in household energy use to a defined amount, either based on energy use or related emissions, as sufficiency approaches. In these cases, there was a deliberate attempt to limit energy use to a quantifiable amount. Nonetheless, the level of energy use considered sufficient remains extremely context dependent and can vary, for example, according to location, climate, number and socio-demographic composition of occupants, building type, culture, etc. (Thomas et al., 2017). The amount of energy considered sufficient to live a good life is also subject to different interpretations depending on the actors involved in determining the measure, and the methods of calculation applied. In this regard, initiatives categorised as sufficiency generally include a reflexive element where people are encouraged to question their energy-related practices, as well as considering the implications of their actions (Princen, 2003; Fuchs and Lorek, 2005; Shove, 2017). Initiatives categorised as sufficiency may also include elements of sharing/repairing and efficiency (reduction and/or substitution). More integrated approaches are particularly evident in community-level sustainability approaches such as eco-communities and transition towns where energy use is considered as a component part in a broader shift toward more sustainable lifestyles. While sufficiency approaches are also evident at the individual (household) level, community-based approaches may have greater potential for shared learning and diffusion of changes in social practices.

Table 7 Examples of sufficiency initiatives from the ENERGISE database (see Jensen et al, 2017)

Name	Description	Objectives
El Valle de Sensaciones	A prototype of an Ecovillage Laboratory. The focus of the project is an experiential integration of socio-ecological dimensions. Founded by a couple being fed up with mainstream unsustainable practices who found the perfect spot for the ecovillage. Built over 10 years.	Learning in action, inspiring and training others for transforming their practices to sustainable living.

On débranche - national research project	In partnership with Happy City Lab, a research team organised a community event engaging with two cooperative buildings; residents were invited to turn off all electrical appliances (except for refrigerators) and join in a 'Disconnect' community event, by candlelight. Activities were designed for children, teenagers and adults (lantern making workshop, star gazing, fire dancers, etc.). Light in public spaces in buildings and in the surrounding area were turned off or diminished.	Reflecting on what it means to be 'digital' and experiencing living without electricity, and stimulating inter-generational discussions and experiences.
Wir leben 2000 Watt	A large campaign (10 participating towns) that tries to convince citizens to reduce their energy consumption so that they only use 2000 watts	Aiming for a 2000 watts society by 2050 by addressing changes in multiple aspects of everyday life

SHARING/REPARING

Initiatives categorised as sharing/repairing could be understood as 'towards' sufficiency. These initiatives have characteristics that may be considered examples of sufficiency and/or efficiency, but what category they ultimately fall into is case specific, as well as being somewhat subjective. Initiatives in this category look toward alternative approaches for reducing household energy use and seek to achieve societal transformations through a reconfiguration of daily practices and structures. Examples include initiatives that promote sharing or repairing of products. While they might at first appear to promote sufficiency, on closer inspection these initiatives may fall outside of our definition.

Sharing can manifest in different ways including renting, co-ownership, lending and swapping. In these various models of sharing, the communal use of goods and services means that overall demand can be met with fewer resources. Hence, an environmental gain can be realised by using existing resources more intensely. For example, car sharing can reduce the (perceived) need for some individuals to own a car, or reduce the overall km driven. Car sharing services, such as Mobility Cooperative in Switzerland, also manage a stock of vehicles that are highly efficient, and link to rail and bike-sharing, thus promoting multi-modal mobility (Sahakian, 2017). However, sharing can also lead to poor user behaviour as the user does not own the product and may be less careful in its use, leading to higher impacts (Tukker, 2015). Sharing can also promote excessive consumption if social norms around consumption practices are not challenged. For example, two neighbours, each with a small garden, might decide to share the use of a petrol-driven leaf-blower, even though they rarely have an issue with fallen leaves. While this is an example of sharing, this would not be considered sufficiency of resource consumption if

the product (i.e. the leaf-blower) were considered superfluous to requirements. However, it could be considered efficiency if the alternative was to have a greater negative impact, for example if each neighbour were to purchase their own leaf-blower. On the other hand, if the neighbours were to question the need for the product (i.e. the leaf-blower), they may decide that they could use a low impact alternative to achieve the same result, for example they might share a sweeping brush instead (sharing as sufficiency).

Repairing strategies aim to prolong or optimize the life cycle of products (Schanes et al., 2016). Energy savings can be achieved by reducing the purchase of new products, or by maintaining or improving the performance of existing products. Initiatives can promote the repairing of goods by individuals themselves (e.g. do-it-yourself), or provide the supports necessary to carry out repairs (e.g. repair cafés). In the latter cases, individuals may not have the skills or capacities required to conduct repairs themselves, and are assisted by trained experts. While increasing product lifespan has potential for enormous environmental benefits, prolonged use of energy-intensive products (e.g. washing machines, refrigerators) can outweigh the benefits that can be achieved by replacing older less efficient appliances with more efficient products. In these cases, repairing products and extending their product life can result in a net environmental loss (Schanes et al., 2016). Hence, the benefits of repairing are context specific and, in general, considered as 'toward' sufficiency.

Table 8 Examples of sharing/repairing initiatives from the ENERGISE database (see Jensen et al, 2017)

Name	Description	Objectives
Pumpipumpe	Launched in Switzerland in 2012, this initiative is about sharing appliances and other household items between neighbours. A set of stickers can be ordered online, which are then affixed to a household mailbox and indicate exactly what items are available. For example, a symbol for a lawnmower or juice blender would signal to neighbours that such items can be borrowed. Recently, pumpipumpe has been sending stickers across the world and especially across Europe, from France to the Czech republic.	Reducing the purchase of household items, while promoting sharing and community relations.

Aha!Car platform	Aha!Car is a web platform for carpooling. It creates a social network among its users. It is designed in such way that neither the drivers nor passengers receive any financial gain but rather distribute the costs of travel amongst themselves. The platform is completely free to use for its customers.	Creating a positive effect on the environment by car-sharing
R.U.S.Z	RUSZ is a kind of a repair centre that employs long-term unemployed people. Broken household appliances can be brought and repaired there. Furthermore, some appliances can be transformed to use less energy.	Lowering unemployment-rate and repairing devices (so that less new devices have to be produced) as well as making devices less energy-consuming

EFFICIENCY

Energy efficiency is about improvement in the input-output relationship. It reflects the return or unit output generated relative to the required unit input, with the goal of maximising the value created in relation to the resources used. Energy efficiency strategies can also increase outputs while maintaining the negative impacts, or maintain outputs while decreasing impacts, or a combination thereof. For example, efficiency gains are realised when fewer inputs are needed per unit of energy produced, or more services are produced without a relative increase in inputs. While efficiency improvements can deliver considerable savings in household energy use and related CO_2 emissions, they have thus far been insufficient to offset increases in overall resource use and environmental impacts associated with growing global demand (Thomas et al., 2015; Shove, 2017). Efficiency improvements can also reduce the cost of products and services and make them more accessible to a greater number of people, which can lead to overall increases in energy use, otherwise known as the 'rebound effect' (Chitnis et al., 2013; Figge et al., 2014). Additional rebound effects can materialise if savings realised through more efficient energy use are subsequently offset by increased energy demand in the wider system. For example, this can manifest in terms of monetary savings that are later spent on high-energy demand services (e.g. air travel), or energy efficiencies that are negated by changes in living conditions (e.g. higher room temperatures).

We distinguish energy efficiency strategies under two broad categories, reduction and substitution, although many initiatives contain elements of both. For example, a home energy audit might provide advice to turn down a thermostat by one degree (reduction) and switch to LEDs (substitution). In the case of such initiatives, they are simply categorised as efficiency, implying that they contain elements that fall under reduction and substitution.

Strategies that aim for a reduction in energy use or related emissions tend to have a strong focus on behaviour change, and therefore may also (inadvertently) challenge existing social practices. These initiatives might promote measures such as turning down thermostats, taking shorter or less showers, putting lids on saucepans when cooking, washing clothes at lower temperatures, etc. At the same time, reductions in energy use can also be achieved with material changes such as insulating walls. These changes require little or no behaviour change and can be particularly susceptible to rebound effects, for example by increasing room temperatures instead of reducing overall energy use (Gram-Hanssen, 2011).

Efficiency gains can also be achieved through substitution, i.e. by replacing more harmful products with greener products. This can be achieved in a number of ways. For example, some strategies promote direct substitution of products that serve the same purpose and in many cases do not require significant behaviour change on the part of the individual householder (e.g. replacing fossil fuels with renewable energy in the wider energy system), whereas other initiatives promote the substitution of more environmentally harmful products but also require significant behaviour change as well as potential changes in practices (e.g. replacing driving with cycling). Other relatively straightforward substitution of products such as replacing inefficient light bulbs with LEDs or replacing inefficient household appliances may or may not lead to changes in household practices. Moreover, simple replacement of less efficient products does not challenge existing conceptions and norms around energy use and can inadvertently reinforce already unsustainable practices (Thomas et al., 2015; Shove, 2017).

Table 7 Examples of 'efficiency' initiatives from the ENERGISE database (see Jensen et al, 2017)

Name	Description	Objectives
Program for Ignalina "Energy efficiency improvement in buildings"	Energy efficiency measures aimed at modernizing the multi-apartment and public buildings by improving their energy efficiency characteristics. Activities such as repair and/or reconstruction of the external envelope of buildings and upgrading and/or reconstruction of public building energy systems by improving their energy characteristics.	The main aim of the program was to improve energy efficiency in multi-apartment residential buildings.

REMODECE	REMODECE contributed to an increased understanding of electricity use in households resulting from different types of equipment, consumers' lifestyles, and comfort levels. The project evaluated how much electricity could be saved by the use of the most energy efficient appliances, by adopting a suitable behaviour and by the reduction of standby consumption.	Estimating the energy savings potential in electricity consumption of the EU residential sector and providing a set of policy and practical recommendations for different types of equipment (i.e. Electric Appliance Energy Guides)
SAVE project	Project aims to increase awareness about energy labels, with help of an information package that contains brochure, web page and other dissemination material, combined with educational events.	Raising awareness about various energy labels; and indirectly promoting environmentally friendly decisions such as energy efficiency measures and using energy efficient appliances and buildings.

Table 8 Examples of 'efficiency – reduction' initiatives from the ENERGISE database (see Jensen et al, 2017)

Name	Description	Objectives
START2ACT	START2ACT aims to reduce residential energy consumption in the EU via changing the behaviour of consumers in their everyday lives by approaching them at their workplace. With a focus on European start-ups and young SMEs, the project aims at triggering action by young entrepreneurs and their emerging enterprises as well as by the owners and staff of young SMEs to introduce energy efficiency measures within their daily routines.	Unleashing the potential of energy savings at European start-ups and young SMEs via a set of innovative educational and capacity measures.
Bye, bye Stand-by!	The overall goal of the project is to inform people through a leaflet about the use of stand-by electricity and stimulate them to reduce its use.	Lowering energy consumption in households through energy advice in energy poor households. Influencing energy related behaviour through dissemination of leaflets.

SAVES2: Students Achieving Valuable Energy Savings 2	SAVES2 is an energy-saving competition, catalysing sustainable energy behaviours among university students to help them reduce their exposure to fuel poverty. It engages students living in university accommodation and in the private-rented sector. Social media and digital communications (quizzes, photo competitions) are used to raise awareness of how students can save energy in a fun way.	Students in dormitories save energy, competing with their peers in other dormitories. Students follow their performance online and receive feedback, which encourages further action.

Table 9 Examples of 'efficiency – substitution' initiatives from the ENERGISE database (see Jensen et al. 2017)

Name	Description	Objectives
Solar checks	This initiative offers a free solar feasibility check for households to motivate households to invest in solar energy systems.	Motivating households to invest in solar energy
Top quality energy efficient lighting for the domestic sector (PREMIUMLIGHT)	The central objective of the PremiumLight project is to facilitate the transition to efficient high quality lighting solutions in households by motivating consumers to buy and use high quality energy efficient lighting products.	Increasing the take up of highly efficient LED light bulbs through best-practice advice to consumers
Top Ten website	Online information database, evaluating the energy efficiency of appliances and technologies.	Providing information towards energy efficiency, using life cycle impact analysis. Pressurising manufacturers to develop and put on the market more efficient products.

The table below summarises each category in the RCT and gives a few descriptive examples as well as summarising the SECI examples.

Table 10 Overview of Resource Consumption Typology Categories with examples

Category	Description	Example	SECI example
Sufficiency	Limiting what is produced and consumed in absolute terms	Eco-communities; Initiatives that limit	El Valle de Sensaciones; On

		energy use to a defined level	débranche - national research project; Wir leben 2000 Watt
Efficiency	Reducing the ratio between value created and resources used or impact created	Using greener products and changing behaviour	Program for Ignalina "Energy efficiency improvement in buildings"; REMODECE; SAVE project
Efficiency-Reduction	Reducing energy used or emissions generated	Turning down thermostats; unplugging dormant appliances; Insulating attics and walls	START2ACT; Bye, bye Stand-by!; SAVES2: Students Achieving Valuable Energy Savings 2
Efficiency-Substitution	Substitution of more harmful products with less harmful products	Replace inefficient lighting with LEDs; purchasing energy efficient appliances; Switching to electric vehicles; using bicycle instead of car	Solar checks; Top quality energy efficient lighting for the domestic sector (PREMIUMLIGHT); Top Ten website
Sharing/Repairing	Initiatives that have characteristics of both sufficiency and efficiency - Context dependent	Car sharing; sharing appliances; repairing products	Pumpipumpe; Aha!Car platform; R.U.S.Z

In the following section, the results of the analyses of the SECIs according to the two typologies are presented.

4 RESULTS AND CONCLUSIONS

Each of the 1067 SECIs collected and presented in ENERGISE D2.1 (Jensen et al, 2017) have been analysed and coded in accordance to the process elaborated on above.

Strikingly, but maybe not surprisingly, the number of SECIs categorised as ‘sufficiency’, ‘changes in everyday life activities’ and ‘changes in social and material organisation’ are few, whereas the majority of SECIs can be categorised under ‘efficiency’ (primarily a mix of reduction and substitution) and ‘changes in technologies and products’ as well as ‘changes in individual’s behaviour’. This fits well with current research, indicating the dominant focus on individual behaviour change programmes (e.g. Shove 2010) and efficiency schemes (e.g. Shove 2017). Notably, this representation of problem framings is in spite of ENERGISE’s focus on collecting information on SECIs that aim to reduce energy *use*. SECIs that are strictly focusing on energy production are not included in the resulting selection of SECIs and thus not represented in the numerical results presented below.

The tables below give an overview of the number of SECIs that fall under each category in both typologies. These should be read in context with the nature of collected SECIs and what they represent. For example, researchers did not necessarily collect information on SECIs that specifically focused on sufficiency. The SECIs that have been categorised within sufficiency are SECIs that include aspects of sufficiency, often as a result of their problem framing.

Table 11 Resource Consumption Typology and frequency of occurrence in database (NB some initiatives may appear in more than one category)

Sustainable consumption category	No. initiatives	% of total initiatives
Sustainable resource consumption	1067	100
Sufficiency	97	9.09
Sharing/Repairing	35	3.28
Efficiency	961	90.06
Efficiency (reduction and substitution)	622	58.29
Efficiency (reduction only)	156	14.62
Efficiency (substitution only)	183	17.15

Table 12 Problem Framing Typology and frequency of occurrence in database

Sustainable consumption category	No. initiatives	% of total initiatives
Sustainable resource consumption	1067	100
Change as changes in Social and Material Organisation	147	13.7
Change as changes in Everyday Life Activities	124	11.7
Change as changes in Individual Behaviour	514	48.2
Change as changes in Technologies and Products	282	26.4

It is important to note that the SECIs have been categorised as a result of a collaborative approach within the ENERGISE consortium. However, the ENERGISE consortium recognises that the categorisation of each SECI within both the RCT and PFT typologies is subject to change if actors from identified SECIs object to the category within which they have been placed and provide more information about the initiative that may result in a recategorisation. In D2.3 the categorised SECIs are mapped in an Open Access Database and actors from all identified SECIs are encouraged to get in touch and engage in debate about problem framings of the sustainability challenge.

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