

Identification of promising instruments and instrument mixes to promote energy sufficiency

Deliverable 5.5

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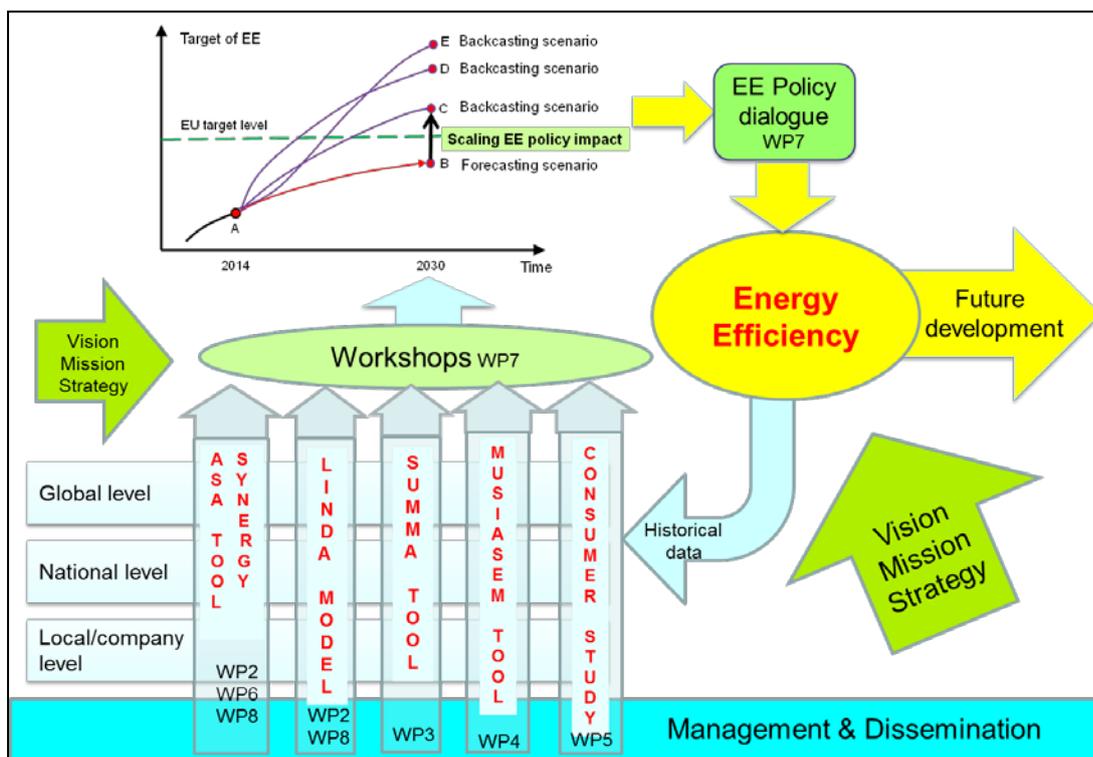
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The EUFORIE project

The strategic goal of the EUFORIE project is to provide useful and accurate information and knowledge in the field of energy efficiency for the EU Commission and stakeholders in the Member States. The tangible objectives are the following:

1. To provide energy and energy efficiency trends and their drivers, synergies and trade-offs between energy efficiency related policies, as well as energy efficiency scenarios (WP2).
2. To provide data about implementation of energy efficiency in specific processes, sectors and entire systems, in order to understand bottlenecks/efficiency drops and suggest improvements (WP3).
3. To carry out analyses of efficiency of provision, from making useful energy carriers from primary energy sources, and from conversion of energy carriers to end uses across macro-economic sectors (WP4).
4. To identify policy instruments and other measures leading to significant reduction in the energy consumption of households (WP5).
5. To analyse the relationship between investments and change in energy efficiency, and to develop indicators to describe changing energy efficiency at the company level (WP6).
6. To carry out participatory foresight for European stakeholders of energy efficiency with a target of providing ideas for the energy efficiency vision and strategy in the European Union (WP7).
7. To compare energy efficiency policy instruments and measures and their impacts in China and the European Union (WP8).

The EUFORIE Work Packages relate to each other. The project applies different quantitative and qualitative analysis methods to energy efficiency in the EU and its Member States at different levels and from different perspectives. These analyses provide input for foresight activities, which serve European energy efficiency vision and strategy process by generating useful information. Management (WP1) and dissemination (WP9) run in parallel with the research and innovation activities.



Tasks of this deliverable related to WP 5

Work Package 5 takes the task to identify policy instruments and other measurements which are leading to significant reductions in the energy consumption of households. The first phase of the project provided a stock taking of administrative, economic or informational instruments and instrument mixes. Next to EU issues in general specific attention was given to Germany, Finland, Hungary, Italy, Latvia, Romania, Spain and the UK (see D 5.1). The analysis resulted in a recommendation of promising strategies for the development of energy efficiency strategies, policies and programmes at all levels of governance (see D 5.2).

Recognising the limits of the efficiency approach the second phase of the project turned attention towards measures and instruments for energy savings in terms of sufficiency. We first analysed what can be learned from those streams of research and civil society activities trying to achieve reduced energy consumption through instruments of societal downshifting instead of - respectively in combination with - technological efficiency. The deliverable D 5.3 thus presented a stock taking on social innovations towards energy sufficiency. It elaborated what fosters and hinders such innovations, described key projects and actors in the field and provided first ideas which kind of policies would further support energy sufficiency.

The results of the stocktaking were presented, discussed and further developed at various workshops and conferences with different stakeholders from academia, via policy to civil society (D 5.4). As a result this deliverable presents promising instruments and instrument mixes to promote energy sufficiency (D5.5).

Key findings and summary for stakeholders

Energy policy oriented towards sufficiency criteria can reach two major targets. Based on the concept of enoughness, sufficiency implies that every consumer has as much as necessary but does not squander energy. This implies both overcoming energy poverty through providing enough energy for poorer households, and indicates limits for per capita energy consumption in absolute terms. Mainly due to this upper limit, which offers the possibility to skim off overconsumption options resulting from rebound effects of energy efficiency improvements, complementing energy efficiency by **energy sufficiency provides the most promising opportunity to still reach EU energy and climate targets**. Only within sufficiency limits the well-established energy efficiency technologies and instruments can develop their full potential. Sufficiency policies are necessary to make efficiency effective.

One of the dominant areas of household energy consumption – and as such in need of sufficiency – is housing and heating. So far the issue is often limited to the promotion of constructing new, low energy buildings and smart electrification, and in case of existing buildings, improving isolation and heating system efficiency. Underrepresented in the public debate is the constantly increasing dwelling area per person. This not only determines the area which needs to be heated or cooled but also provides space for additional appliances, often electricity consuming ones. Our research therefore shifts the perspective from increasing efficiency of/in buildings towards sufficiency oriented size of sustainable homes. Raising attention leads many to increase awareness and some to change habits, as the uptake of vegetarian and vegan lifestyles over the past decade has shown. This paper thus intends to kick off the societal debate how policies can support creative structures where sufficiency can flourish. To initiate discussion we start from the suggestion in the literature that 30m² per person could serve as orientation for an upper sufficiency level – measured as a national average. Whatever is over this line could be perceived as the sufficiency potential. Such a national average, however, needs further considerations regarding just allocation and differences between different household sizes.

To factually develop towards shrinking and not further increasing individual floor space, various policy measures would need to be established in parallel. Most relevant are to rethink building regulation currently hindering sufficiency developments, limiting further soil sealing in favour of better and more sufficient use of the existing building stock, shifting to a land tax and a progressive property tax, establishing sufficiency criteria for public loans and – last but not least – set up sufficiency consultancy based at the municipality level.

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Rarely in human history have so many things gone so badly wrong in so short a time. We need to be radical in our analysis. We need to be visionary in finding solutions that are just, benign, and environmentally sound. And we must be pragmatic in their implementation.

(Spangenberg, 2018 p. 6)

0. Methodology

The identification of policies and policy mixes presented in this paper was carried out in a combination of desktop research, policy analysis and action research (stakeholder interviews, expert panels, discussion groups, etc.). The results from the stocktaking (D 5.3) were presented, discussed and further developed at the following events:

- EUFORIE Expert workshop on sufficiency, in collaboration with BUND (Friends of the Earth^[1] Germany), Frankfurt, July 2017
- EUFORIE workshop at the Festival of New Economic Thinking , Edinburgh, October 2017
- EUFORIE advisory board meeting, Barcelona, April 2018
- Workshop at the EUFORIE Final Conference ‘Energizing Futures’, Tampere, June 2018
- 6th International Degrowth Conference ‘Dialogues in turbulent times’, Malmö, August 2018 (several workshops and presentations)
- EUFORIE Roundtable discussion ‘From physics to policy: Overcoming misperceptions in energy policy’, Brussels, September 2018

and through presentations at the

- Friends of the Earth workshop, Frankfurt, April 2017
- Planetary Boundaries Conference, Berlin, April 2017
- World Academy of Art and Science XIV International Colloquium, Sustainability Institute, Stellenbosch, May 2017
- GRF conference ‘Sustainable Lifestyle, Livelihoods and the Circular Economy’, Brighton, June 2017 (several presentations)
- EU Calc workshop, Brighton, June 2017
- 12th European Society for Ecological Economics (ESEE) Conference, Corvinus University, Budapest, June 2017
- 23rd International Sustainable Development Research Society Conference, Bogota, Columbia, June 2017
- Environment Europe Summer School, Oxford University, August 2017
- BIWAES Conference ‘Energy futures, environment and well-being’, Naples, September 2017 (several presentations)
- BuJu Env. Youth Organisation, Workshop on Growth, Consumption and Sufficiency, Berlin, October 2017
- Friends of the Earth Conference at the EU EcoSoC ‘Eco-sufficiency: moving beyond the gospel of eco-efficiency’, Brussels, November 2017
- Environment Europe Spring School, Oxford University, April 2018
- World Academy of Art and Science, World University Consortium ‘XV International Economics Colloquium’, University of Paris-13 North, Paris, May 2018
- 24th International Sustainable Development Research Society Conference ‘Actions for a sustainable world: from theory to practice’, Messina, June 2018
- 15th Conference of the International Society for Ecological Economics ‘Ecological Economics and Socio-ecological Movements: Science, policy and challenges to global processes in a troubled world’, Puebla, Mexico, September 2018

^[1] Friends of the Earth was frequently chosen as partner for dissemination as it is so far the only European NGO which has actively participated in the sufficiency debate; the intention is to broaden the spectrum of civil society organisation making use of EUFORIE work and results in their future activities

- First North-South Conference on Degrowth, Palacio de Medicina, Mexico City, September 2018
- Scientific pre-conference to the Post Growth Conference of the European Parliament, Brussels, September 2018
- World Social Science Forum 'Security and Equality for Sustainable Futures', Fukuoka Japan, September 2018
- '30 Visions Sustainability' Congress, Madrid, October 2018
- Workshop 'Housing or Degrowth', Wuppertal, October 2018

All these events contributed in one form or another to the specification of the findings and recommendation given in this deliverable by providing feedback to preliminary results, stimulating refinements of the research questions and pointing to additional references and materials.

In addition, valuable insights also resulted from the round table discussion 'Energy sufficiency: what are the messages for policy makers' organised by the European Council for an Energy Efficient Economy (eceee) in Geneva February 2018.

As the lists above already indicate, the field of (energy) sufficiency is recently under lively development. The EUFORIE project and the broader sufficiency debate have been fertilising each other not at least through the regular exchanges in the ENOUGH network - International Network for Sufficiency Research and Policy (for more details see box: The ENOUGH network).

1. The uptake of sufficiency in the sustainability debate

Sustainability is defined as a state in which humanity fulfils the essential needs of its individuals while remaining within the ecological boundaries of what Earth can provide. Over the last – about three – decades policy and society have worked towards this state mainly through enhancing new technologies providing greater efficiency. But energy efficiency is specifically and intentionally not about conservation. Bigger, more powerful, more functional products already get labelled as efficient when they use less energy than other equally big, powerful, functional products (Calwell, 2010).

In addition, during the same time a plentitude of activities and initiatives have taken place completely ignoring any possible impacts on planet and people. The omnipresent Information and Communication Technologies (ICT) with their impact on social live, consumption habits and their demand for and conflicts around rare earths are only one example here. As a result ecological boundaries are more overstretched than before, inequity is rising and resource conflicts endanger societies. Consequently re-strengthening the increasingly eroded sustainability concept gathers attention. The Degrowth movement is one example; another is the growing attention for sufficiency.

Sufficiency highlights the need to combine ecological aspects with social ones. The most recognizable difference is a clearer emphasis on limits than considered in the sustainability debates of recent times. Of course, calls to respect the upper and lower limits e.g. for living within an environmental space (Spangenberg, 1995) were made before, derived by operationalising the Brundtland Report (Brundtland, 1987). But those were hardly set into (political) action. While the previous debate mainly remained quantitative, sufficiency looks also looks at qualities: how to equitably reaching a good life (Bierwirth, 2018a). Sufficiency now materializes in concepts and initiatives like 'Contract and Converge' (Vadovics et al., 2012) 'Living well within Limits' (LiLi) (Steinberger, 2017) the 'Doughnut Economy' (Raworth, 2012, 2017) or 'Consumption Corridors' (Di Giulio & Fuchs, 2014; Fuchs, 2017) integrating in a more strategic way insights from social science.

An article by Spengler on the 'two types of enough' explains well that the envisioned sufficient lifestyles need to offer enough for everyone to live a dignified life as justice theory calls for but also that there is an enough in sense of a maximum as identified in environmental science (Spengler, 2016). The interesting but still broadly missing – academic and societal – debate is (a) how to identify the upper and lower limits (b) how to reach the sufficiency space between the limits and (c) how to arrange lifestyles worth living within the space.

With this clear awareness of limits sufficiency is an antithesis to the orientation to the permanent 'higher, further, faster, more' driving the actual economic system. Established as an organising principle of society it could replace the growth paradigm and thus offer the opportunity to overcome the distributional dynamics and reap the benefits of a more equitable society (Spangenberg, 2018).

In this understanding sufficiency is steering technology and the combined potential of technical and social innovations to keep climate and energy targets. In energy debate and policy a sufficiency strategy can help efficiency measures to unfold their full potential as the sufficiency limits avoid rebound effects. In addition, while the dominant efficiency approach is limited in its ambition to reduce energy or resource input per product or service unit sufficiency considers the reduction of resource and/or energy consumption per capita. However, as voluntarily and informed sufficiency actions so far require strong motivation and a good understanding of the relative environmental impacts of different goods, services and activities (Sorrell et al., 2018) structural political support has to flank and steer them.

The EUFORIE focus: energy sufficient living

The facet the EUFORIE project – respectively its research from the consumption perspective –contributes to the sufficiency debate streams from its orientation on energy issues. It therefore primarily strives for a state in which people’s basic needs for energy services are met and equality and ecological limits are respected. Considering further the insights gathered in the previous phase of the project (see Deliverables 5.1 and 5.3) a focus in this deliverable is on housing and the important impact it has on (energy) sufficient lifestyles as many end uses of electricity in the home as well as heating energy consumption depends on. Specific attention is given to the dwelling floor area per person. The question whether the energy is provided from renewable resources is relevant, but only one aspect in the considerations. Even if energy services are provided 100 % by renewable sources the living area also impacts energy use in other parts of the system. For example energy and material flows related to construction increase when dwelling space increases and so potentially does land use. Increasing urbanised area at the edge of cities is contributing to urban sprawl which again is not only energy consuming, but also contributes to soil sealing and fragmentation of landscapes, posing risks to ground water quality, in some places to flood management, and most importantly to the ongoing loss of biodiversity. Requesting dwelling size and focusing on the available dwelling stock are therefore an important aspect of energy sufficient living.

As in the earlier parts of the EUFORIE project we consider that a meaningful understanding housing/living includes more than just the four walls building the own flat or the appliances used within them. It also has to consider the conditions in the social and physical surrounding: the neighbourhood. Therefore we also reflect on aspects of daily provisioning or sufficiency related mobility patterns.

Debates on sufficiency sooner or later tend to reach the point where the question is asked: whom to start with, policy or society. As so often, a parallel development seems to be the most adequate approach. For this deliverable the primary purpose is to identify promising instruments and instrument mixes for policy making in support of a development towards more energy sufficiency. This task is followed through in section 5. Before, however, we lay out suggestions for two additional areas important for a broader uptake of a culture of sufficiency. Section 2 suggests some initial steps how to kick off and what to avoid in a societal debate intended to induce sufficiency thinking. While we acknowledge that ultimately it is political decision maker who have to institutionalise a sufficiency orientation, we hold it is not their role to be trail blazers for such policy changes. For three reasons we are convinced that such a debate mainly has to come from broader societal audience – on the one hand, the probability is pretty low that good-willing decision makers could be successful in implementing sufficiency policies from their fringe position. On the other hand, even if something would be decided, the current growth mania consensus would tend to turn sufficiency support measures into mere window dressing, and on a third one, even if no such misuse occurs, government lecturing society on reducing consumption could be easily (mis-) understood as austerity plus plus, provoking resistance rather than reflection. Given these circumstances, policy is for the time being restricted to a role of niche management (which can be possible against the mainstream), creating supportive structures where sufficiency can flourish. To inform the societal debate section 3 concretises the sufficiency approach in the area of sufficient living, providing scientifically informed upper and lower boundaries. In addition section 4 throws some light on the potential role business can play to support sufficiency. Against this background section 5 then describes promising policy instruments considering the roles of different levels of policy making as well as distinguishing between different types of instruments. Section 6 combines these various strains and in an actor centred approach lays out how different forces can join up to induce sufficiency. Section 7 finally concludes and summarises the main findings.

2. Developing narratives for sufficiency

The term sufficiency so far is hardly known in a broader public not even among those living a relative sufficient lifestyle. Quite some of those who know the term tend to relate it to voluntary simplicity or downshifting. This frequently leads to discussions whether a new or different word would be more appropriate. In context of sufficient living the term 'spatial efficiency' is suggested to connect the term to existing debates. A common reply of sufficiency proponents, however, is to better link sufficiency to positive connotations and emphasize the co-benefits it brings for individuals and societies (Bierwirth, 2018a). Through sufficiency we can gain better air quality in inner cities, better and healthier food, recreation possibilities nearby etc., just to give some examples. These co-benefits are the powerful argument which raises sufficiency approaches above energy saving only. They might be valuable in the upcoming processes of societal transformation.

For spreading the message of sufficiency storytelling seems to be inevitable, as always in a context where policy or technological innovation goes into a new direction. Storytelling is a means of coping with uncertainty, with multiple perspectives and the absence of any single solution or 'silver bullet' to tackle problems when they arise. The sufficiency story can be compared to a fable, where all people are involved in a setting and have to play their individual part in the solution of the challenge because protagonists are normal people who need to respond to a challenge. They are not saved by fictitious technological heroes but must rely on their own actions. It is less soothing than the hero story, as it asks for participation, reflection. But at least it does not try to provide an easy solution which in the end does not deliver (Janda & Topouzi, 2015; Janda, 2011).

A good starting point to unfold the sufficiency story is the emerging insight that GDP is neither a good indicator to measure and assess the welfare of nations (Stiglitz et al., 2009) nor has it ever been designed to be one. It is based exclusively on monetary aspects ignoring non-monetary contributions to wellbeing. It is even well established, that the more people focus on financial and materialistic goals, the lower is their well-being (Ryan & Deci, 2001). What is needed therefore is an orientation strong enough to replace the narrative of 'the more the better'. This is not an illegitimate intervention to disturb the wise invisible hand of free markets. Also existing markets are not the depoliticized worlds they claim to be. Already today decisions left to the praised consumer sovereignty depend on how markets are actively constructed and how the infrastructure is configured (Fuchs & Lorek, 2001; Grandclément et al., 2015). Therefore it is a fair undertaking trying to marginalize the messages suggesting that accumulating material goods leads to life satisfaction (Fuchs et al., 2019). Sufficiency in this sense is – not at least – freedom from e.g. omnipresent advertising or a protection from the pull of consumer capitalism (Reichel, 2018). Also the right of self-determination against personalised manipulation in social media is an important facet in a sufficiency argumentation. Instead of materialism sufficiency is built on the notions of well-being and justice.

There is an increasing number of actors searching for alternative forms of living and consuming in line with such paradigms. Transition towns, food sharing, urban gardening, fair trade, sustainable clothing initiatives, dumpster-diving or zero waste lifestyles are examples here. Such initiatives demonstrate that alternative ways of consumption allowing both living a good life and respecting planetary boundaries and social justice are possible. Each of them may be imperfect and/or not up-scalable, but they represent a common search based on broadly shared goals (Fuchs et al., 2019)

A further encouraging message is that humans following a narrative of a good life and of justice does not have to be invented or constructed. Not only power and achievement, also the aim of enhancing others and overcoming selfish interests is basic to the human nature (Schwartz, 1994). Thus strengthening the latter can build a normative foundation for societal cohesion. Practically this is relevant because individuals, approached in their role as citizen, actually do not primarily think in

dimensions of self-interest. They are able to adopt a non-individualistic mentality overcoming selfish interests, when they are asked to assess and decide upon environmental policies (Defila et al., 2018).

A concept that is suited to operationalize sufficiency is the concept of the Environmental Space. It integrates social justice, planetary boundaries, and wellbeing individuals are entitled to worldwide by defining an upper boundary of resource consumption, the ceiling, based on the fair sharing of resources as the common heritage of humankind, within sustainability limits (Buitenkamp et al., 1993; Weterings & Opschoor, 1992) and a lower limit, the floor, based on sufficient resource access (Spangenberg, 1995). Sufficiency in this context has been defined as a resource endowment sufficient to permit its owners/recipients to actively participate in the respective society and has to be defined in democratic processes, which is why the lower limit earned the name of 'línea de dignidad' in Latin America. While the latter demand has been endorsed by the United Nations in their support for a 'social protection floor' in the outcomes of the 2012 Rio UNCSO Conference (UN, 2012) the former, operationalised by the 'Planetary Boundaries' concept (Rockström et al., 2009; Steffen et al., 2015) is neither mentioned in the Rio 2012 declaration 'The Future We Want' nor in the UN 2030 Agenda for Sustainable Development and its SDGs (UN, 2012; UNGA, 2015). In between the limits consumer choice can reins freely. Thus not consumption patterns, but consumption levels in physical terms are to be regulated in the Environmental Space concept (Spangenberg, 2014).

(Sustainable) Consumption Corridors (Blättel-Mink et al., 2013; Fuchs, 2017) are a more recent concept partly building on the environmental space. Just like in the Environmental Space, Consumption Corridors are defined by minimum standards, allowing every individual to live a good life, and maximum standards for every individual's use of resources up to the degree guaranteeing others access to sufficient resources (in terms of quantity and quality), both in the present and the future, and within environmental limitations. Neither concept questions the existence of needs and the necessity to fulfil them, but carefully distinguish between needs and wants, with needs being an anthropogenic constant of a limited number of physical, psychic and social needs, while wants are potentially unlimited social constructs (Max-Neef et al., 1986). Their limited coupling is illustrated by the fact that energy needs seem to constantly increase - as a survey in context of the UK research on lower limits for energy consumption indicates (Lorek, 2018; Walker et al., 2016).

Caring for needs is a sustainability necessity, and can be achieved by a wide variety of satisfiers which can be material goods but also social processes. Thus both versions do not question individual freedom of choice but define limits to individual freedom by safeguarding the freedom of others – a classical liberal principle. In addition, both offer better satisfiers for undenied needs, making a sustainability transition of consumption a shift from unsustainable to sustainable satisfiers for unchanged needs. Like the Environmental Space two decades ago, Consumption Corridors thus offer a promising basis for initiating campaigns enhancing the societal and political awareness of sufficiency and the need to differentiate between human needs and wants (Fuchs et al., 2019), and address the latter with suitable, often non-material and non-economic satisfiers. Unfortunately current economics fails (also) in this respect; welfare economics and its utility approach focus on preference satisfaction and do not distinguish between needs and wants in any valid way.

An interesting aspect how to possibly arrive in a sufficiency stage - or within Consumption Corridors - is provided by Blake Alcott. He points out that caps are a contested but proven instrument to solve problems with limited sources – be it resource availabilities or sink capacities. Politically negotiated input limits (caps) signal incentives to autonomously and de-centrally adjust individual and societal behaviour to maximize welfare within those limits. So instead of wasting effort and time on trying to not cap energy consumption Alcott recommends to shift attention to the social marketing of caps, showing that they are necessary, that they work, that permits will be distributed justly, and that there are ways to soften some of the harshness of doing with less. Democratic acceptance of caps

provided Alcott expects population, material standard of living, efficiency, and renewable energy supply falling into place (Alcott, 2018).

Without orientation through clear sufficiency caps or targets sufficiency activities often have their roots in a feeling of being overwhelmed by the consumption society. People engaging in sufficiency are not all radicals, and do not apply sufficiency in an instant systematic way. They allow themselves internal negotiations and trade-offs – sometimes leading to re-bounce effects (Sorrell et al., 2018) – but at the same time are highly sensitive to the way their behaviour is perceived by others. This suggests relevance for community-based approaches in the process of achieving sufficiency, not only in its definition as a collective goal but also in its implementation. Being part of a collective movement can reduce the sense of marginalisation. Besides that, community-based initiatives tend to contribute more quickly to the diffusion of new social norms. All in all sufficiency seems to gain attraction through increased visibility (Speck, 2015). The French *Colibris* movement may serve as an example. Founded by a respected public figure it is now followed through social networks by 250,000 people. ‘Joyful sufficiency’ is part of their agenda, and sufficiency ideas can be shared and supported through an on-line platform. The research project *Sobriétés* in France shows that it is also feasible to turn institutional organisations into sufficiency facilitators (examples collected by Toulouse, 2017). Both examples follow the principle to make sufficiency a behaviour more desirable and support this through well-targeted messages to specific audiences.

However, also a disaster perspective can pave a way for turning towards sufficiency measures. There are past examples of constraints on energy supply triggering sufficiency measures and behaviours, from the oil crisis in the 70’s to the Fukushima accident. In such cases, the sense of urgency makes it easier to implement large-scale ‘emergency sufficiency’ actions, e.g. car traffic bans on certain days, industrial downshifts, information campaigns, and local regulations to restrict some energy uses (Pasquier, 2011). Such changes do not necessarily come with enthusiasm, and may not persist in the long term once the crisis is over. However, these examples are interesting in so far as they induce doubts on the assumption of ever available energy supply. The acknowledgement of limits (be it potential disasters, peak oil, etc.) is a powerful driver to trigger discussions about and engagement for sufficiency in administrations (Semal et al., 2014). They also reveal that sufficiency efforts are better accepted if there is a sense that everyone takes its fair share. Here again justice considerations are important in sufficiency policy design (Szuba, 2015) (French sources cited from Toulouse, 2017).

As practical contribution to induce the societal debate on sufficiency researchers is the setup of the ENOUGH network, devoted to research and policy for sufficiency (see box below).



The ENOUGH network

In the second half of 2017 a new network devoted to the research and policy of sufficiency was established. It emerged from two parallel national networks in France and Germany and intends to increase exchange and networking between sufficiency researchers and experts in the EU, to reach a critical mass able to put sufficiency at the level it deserves on the EU political agenda (Toulouse, 2017). While focusing on energy issues for the time being mainly for practical reasons the general approach is purposely open to include aspects of resource sufficiency and justice related sufficiency initiatives later on. Also the regional scope is concentrated on the European region only for the initial phase and can be opened up at a later, more settled stage.

The core team consists of researchers and practitioners from six European countries and the wider circle of interested members sum up to about 120 people for the time being. The network is established as an independent body, however with no formal requirements for membership at the moment. An internal (core group) and external mailing list is successfully set up already. Further communication tools – e.g. a platform for sharing documents, to discuss content and to host a thematic online library – are set up as well. The established group on [ResearchGate](#) consists of 80 followers.

Institutional contributors to ENOUGH are eceee, SCORAI and Friends of the Earth Europe. EUFORIE collaborates with ENOUGH in information exchange and mutual learning.

3. Practical application of sufficiency in context of housing/living

What could all this mean regarding sufficient living/housing? According to Bierwirth, a sufficient household can be characterized by adequate space thoughtfully constructed and sufficiently equipped (Bierwirth, 2018b). Fortunately research provides us with information how to define 'adequate'.

Some remarks about a lower sufficiency limit were already made. Energy poverty, population without bath, shower or indoor toilet in their household and with dwellings not at all warm during winter time need to be raised to a sufficiency level. Sufficiency and poverty are contradicting each other. In fact such households are mainly candidates for energy efficiency.

Various data can be found in literature around sustainable consumption, urban planning, climate change or material footprints arguing for and defining adequate lower or upper levels for sufficient individual floor space.

Based on the standards of the International Code Council (ICC) Cohen reports a consumption minimum of 13,9 m² for the first resident and 9,3 m² for each additional person. Translated to a typical 4-person family this would mean at least 41,8m² (Cohen, 2018). With a minimum size of 30m² Rao & Min call for a somewhat higher minimum for single households mainly referring to the need for kitchen and bathroom which do not depend too much on the household size. Interestingly their minimum floor area for a 4-person household is quite similar to the ICC with 40m² calculating additional 10 m² only per additional household member above three (Rao & Min, 2018). Informed by a basic needs approach Pedro and Boueri confirm the 14 m² minimum standards. They found out that in dwellings with less than 8.0 m² of floor space per occupant the prevalence of pathological situations tends to increase. In dwellings with 8.0 to 14.0 m² of floor space per occupant, dwellers' satisfaction tends to be negative. However, they also point out that an absolute direct link between space standards and users' satisfaction cannot be set but depend on culturally framed expectation and lifestyles of the dwellers (Pedro & Boueri, 2011). Population density of a country play a role here or the geographical region with people in Northern European countries in need to spend more time indoors than those in Southern Europe where whether conditions allow for more socialising outdoors (Ropke & Jensen, 2018).

Recognising sufficient living as an aspiration for global equality makes it interesting as well to be aware how the issue of minimum floor space is discussed in other world regions: In Taiwan for example, recommended minimum living space ranges from 7 to 13 m² per person, depending on number of members. In Korea, the minimum standard is 12 m² for one person, and 8–10 m² for each additional member with a threshold closer to 10 m²/cap, which is the actual floor space for middle class Indian (Rao and Baer 2012). China's average home size of 32m² in urban and 37m² in rural areas offers another potential benchmark, since families are typically 3-person households (due to the historical one-child policy), and living standards on average in China are likely to reflect an aggregation of a broad range of population densities and living conditions (Rao & Min, 2018).

Calculations on a sufficiency indicated upper size are mainly made for environmental reasons. Lettenmeier in his research argues on the basis of a globally equal individual material footprint for 'one planet living'. He arrives at a per capita dwelling size of 20m² which would represent the share of housing of an per capita material resource basket of 8 tons per year (Lettenmeier, 2018). This would sum up to 80m² for a 4-person households. Grubler et al. in their energy demand scenario for meeting the 1.5 °C target estimate a global average of 30m² dwelling space per person as a

sufficiency maximum based on current best-practice designs for new construction (mainly in the global South) and for building retrofits (mainly in the global North) (Grubler et al., 2018). Here again no indication about less space need in larger households is given so the maximum size for a 4-person household could be set with 120m². Table 1 provides an overview of upper and lower limits for sufficient floor space as identified by various research.

Table 1 Estimated boundaries for sufficient floor space

	Minimum size		Maximum size	
	Single household	4-person household	Single household	4-person household
Lower estimate	13,9 m ² *	41,8 m ²	20 m ² **	80 m ²
Higher estimate	30 m ² ***	40 m ²	30m ² ****	120m ²

*(Cohen, 2018); **(Rao & Min, 2018); *** (Lettenmeier, 2018); **** (Grubler et al., 2018)

Mainly informed by political acceptability Bierwirth and colleagues suggest to set the benchmark for an upper sufficiency limit in an EU context at 35m² per capita. Perceived as an indication for a national average whatever is over this line could be perceived as the sufficiency potential. While countries like Romania clearly range at the lower level Germany and Finland show the highest sufficiency potential (Bierwirth, 2018a). How large it really is can only roughly be estimated so far and might range up to 30 % in residential buildings (Toulouse, 2017).

Taking the sufficiency target as the orientation technology can help to meet them in an efficient way. To illustrate the sufficiency lenses: starting from a sufficiency perspective would mean minimizing the amount of hot water use in a household which then can result in e.g. the installation of *smaller* solar panels to meet the hot water need (Wade, 2018).

Challenges for a turn towards sufficient living

Realistically moving towards more sustainable living has to face the fact, that cultural norms, supported by powerful interests, constantly push towards an increase in house size and individual space.

For example, many relevant actors actually have financial advantages to increase the house size. As an investment for private consumers the continuous appreciation of land value creates incentives to build large so that the relative increase in the value of property over time is greater. In many cases the self-used flat or house provides financial security in old age. Architects are paid based on housing price and size. Municipalities benefit from local real estate taxes which are higher for larger properties. Banks and real estate agents benefit more from larger and more expensive houses and mortgages (Brown, 2018). Financial reasons even keep tenants in meanwhile too big older dwellings because newer build flats even with less space might be more expensive (Ropke & Jensen, 2018).

An example from Germany may show how much the lenses towards housing are political ones. In 2002 with a population of 82,5 mio inhabitants and 38,9 million dwellings a more ecologically oriented government stated that 'Germany is built' and as a consequence subsidizing home ownership was stopped. In 2016 under a more neoliberal regime the housing issue appeared back on the agenda despite an unchanged amount of inhabitants and an already increased dwelling stock of 41,7 mio. Still a coalition of stakeholders - headed by the comparatively powerful building industry - called for the construction of 270.000 to 400.000 thousand new dwellings a year (Bierwirth, 2018c) and received remarkable attention for their initiate towards better legal and financial incentive for new construction.

Regarding to social norms, media, not at least through movies or TV sit coms provide the image of luxury flats and houses as a normal, at least the desirable. In dense Chinese cities, for example, the

detached house for the typical three person family is the standard graphic for advertising loans for private property.

Generally the acceptance of restrictions to living size seems to be limited as a survey among Finnish decision makers indicate. They responded overly negative to a policy option 'reduction to the size of apartments' (Ahvenharju, 2018). The instrument is nevertheless established – and seemed to be agreed upon – in the context of social housing and partly in cooperative housing (Heyen et al., 2013) which indicates that not only practice but also societal norms are different for those who can afford big houses.

Feasibility of sufficient living approaches

Despite the vested interests explained above there are nevertheless various examples and rationales to decide for sufficient living. Especially in attractive densely populated cities many single households are living close to a sufficiency level already because the public spaces compensate for the small individual living area. This includes forms of co-living where people rent a small private room with access to common facilities and services (Cohen, 2018).

Searching deeper on dwellers desires the physically dominated perception of home comfort it is not temperature or size. More often people are referring to elements like mental wellbeing, companionship and contributory comfort in addition to relaxation, control, visual comfort auditory comfort and familiarity. This perspective can help to shift attention from technically controlling energy consumption to facilitate comfortably sharing the home with others (Ellsworth-Krebs et al., 2018).

This is confirmed by Stefánsdóttir and Xue which list seven kinds of dwelling characteristics influencing subjective wellbeing. Among them size only appears as a sub-aspect of one component¹. They argue e.g. that smaller dwellings and condensed urban structure support the desire to have points of daily destination comparatively close to the home. While neoclassical economics focus on producer-consumer relationship sufficiency gives priority to social relationships, environmental quality and health as significant factors impacting on human wellbeing (Stefánsdóttir & Xue, 2018).

In line with this research from Germany indicate that already about 20% of person actually living in households with at least two people can imagine moving to shared apartments or to live in multi-generation houses once their household size shrinks (Thomas et al., 2017). In projects for alternative forms of living beyond the typical family approach environmentally motivated sufficiency aspects are not the main, often even not an explicit goal. They appear more as a side effect of fulfilling social needs. However, through reducing per capita floor area they contribute to sufficiency. Policy may support such development e.g. through public architectural competitions or requiring that any such competitions should include guidelines and requirements for less living space per person (Fuhrhop, 2014; Thomas et al., 2015).

¹ Private dwelling unit (functionality, size, layout, number of rooms, housing type), Neighbourhood (sharing, living environment, collective living), Location (distance to facilities, diversity), Urban density (compact, overcrowding), Functional quality (usability, flexibility), Atmospheric quality (homely, intimate, spacious, pleasant, cozy, relaxing, recuperating), Quality for social interaction (privacy, contact) (Stefánsdóttir & Xue, 2018, p. 179)

4. Business approaches for energy sufficiency

Assuming responsibility for sufficiency on the consumers' side is not really feasible. Also industrial strategies at the macro-level (i.e. regulations) as well as on the micro-level (i.e. corporate actions) need to evolve. As sufficiency is not as structurally and ideologically compatible with the existing market logic as efficiency, which always allows for growth through becoming better at what you are doing, it forces to think how to do with less and still be economically successful (Reichel, 2018).

On the first sight business administration as a discipline recognizes sufficiency strategies neither conceptually nor instrumentally. Not only that human needs are assumed as endless business administration in addition solely focusses on the individual profitability of the company and does not perceive it as a social actor with societal responsibility (Wild, 2017). Therefore, until recently the notion of sufficiency as a corporate strategy seemed rather strange in context of the mainstream business logic. However, there is a growing body of work studying companies that make do with less (Felber, 2015; Gebauer & Mewes, 2015; Palzkill-Vorbeck et al., 2015; Reichel, 2013).

It identified two ways how sufficiency can find its way in a company's strategy. A first sufficiency strategy for a business is to define - in due time - the right level of engagement respectively its right size which sets the company free from following the growth paradigm once the target is reached. Second, sufficiency in the context of corporate actions could also aim to take over the market with services substituting for products, thus both increasing their own sales and value added while at the same time reducing sales and value added in the market or industry itself. In this case sufficiency does not necessarily have to mean that the company is less profit-oriented. Sufficiency enhancing business decisions than would consider providing products and services that enable consumers to live a lifestyle of sufficiency. The main strategic decision in this case is how far the business model not only follows economic interest but is guided by responsibility for the social and ecological environment (Reichel, 2018; Wild, 2017).

Four *lessens'* were developed in the early 1990s already to serve as guidelines in the search for the right measures and for strategies for sufficiency: less speed, less distance, less clutter and less market (Sachs, 1993 translation cited from ; Schneidewind & Zahrnt, 2014b).

For business strategies

- '*less* speed', meaning slower and more reliable, suggests longer duration of a product and better options for repair and reuse
- '*less* distance', meaning closer and clearer, suggests regional production-consumption chains
- '*less* clutter', meaning simpler and fewer, suggests less product ownership through sharing and common use
- '*less* market', meaning providing and making for oneself, suggests prosumer activities e.g. in cooperative self-help movements

(Wild, 2017)

Specific attention is actually given by business actors to the '*less* clutter' aspects. It incorporates the rising feature of sharing. The aim is to provide access to products one not necessarily has to own. In this context a distinction has to be made between rather different approaches. On one hand, the sharing economy is predominantly commercially oriented, with services provided by profit-oriented companies in formal markets. It has to be distinguished from the commons economy a bottom-up, localized, and democratic organization form of ownership providing access to and use of common-pool resources. The commons economy thus incorporates as well the aspects of '*less* market'. A

further relevant aspect for sufficiency seems to be the form of business ownerships. Especially foundations or co-operatives allow for more collaborative economies (Wild, 2017).

Turning towards the housing business, mainly for real estate companies there are good reasons to turn towards sufficiency solutions. Frequently efficiency measures go hand in hand with high investment costs and sometimes get under pressure in times of economic crisis. Sufficiency strategies in turn can be realized with low or even without investment costs and thus are not only a tool to approach environmental goals but an effective ways to save money; and it can help to win time for the challenging effort to refurbish the existing building stock within the next decades (Pfäffli, 2012).

Also new models of ownership for housing can enable more sufficient solutions. Compared to classical ownership cooperative houses are an model which often allow easier change of flat size and structure and thus can be adopted to developing demands, might it be the increase or shrinking of space (Steffen, 2014). One approach to enable sufficient, community enhancing living in the solidarity-based economy is crowd funding. The German Mietshäuser Syndikat (apartment-house syndicate) e.g. provides advice to self-organized housing projects. It invests in the houses for such projects so that they can be taken off the real estate market (Miethäuser Syndikat, 2016). Especially the flexible use of shared space and facilities for additional rent offer an interesting potential to reduce concerns of investors into sufficiency motivated houses. And so do the reversible structure which allow necessary corrections with small effort (Steffen & Fuchs, 2015).

A further way to support more sufficient living is to give incentives to tenants who like to move to smaller flats. The housing cooperative Gewoba in Potsdam, Germany, for example offers a living space bonus. Tenants who like to get smaller are offered a rent 10% below the normal level (Fuhrhop, 2014).

Finally an interesting measure reflecting the upper/lower limit respectively equity aspect of sufficiency is to include a 20 degree warmth into the apartment rent while billing for a higher temperature (Bierwirth, 2018a).

5. Policy initiatives and requirements for sufficient living

The potential role top-down legislation and regulation can play in promoting energy sufficiency is still a relatively open topic. So far sufficiency policies have not been researched on a broad basis. Nevertheless, the need is recognised for a while (Calwell, 2010) and in Germany and France research networks on (energy) sufficiency emerged around 2015 (Thomas et al., 2015; Toulouse, 2017). Therefore it should not come as a surprise that the international ENOUGH network (see box in section 2) was initiated by French and German researchers, but fell on fruitful ground in related research communities e.g. in Ireland, Italy and Switzerland. With its explicit aim ‘to reach a critical mass able to put sufficiency at the level it deserves on the EU political agenda’ (Toulouse, 2017) it is a policy instrument in itself. What sufficiency scholars agree upon is that sufficiency needs to be supported by structures. Those are set by policy frameworks through administrative and economic instruments. In line with the research in the project we concentrate on instruments for sufficient living in the context of housing. We are aware that some cross-cutting policies aiming at saving energy or greenhouse gas emissions in general, such as energy saving targets, tradable emission or energy quotas, energy taxes, progressive energy tariffs, caps on energy sales, and general information campaigns on energy savings are nothing new in the policy area. But they can enfold ambition if they promote sufficiency and not just efficiency.

General target areas

Meaningful energy policies targeting sufficient living first of all should discourage the increase of energy use which frequently appear through a variety of factors such as increased floor space, increased comfort levels beyond what is reasonable, increased number and larger appliances/equipment and increased usage of energy consuming equipment.

Especially instruments for limiting average dwelling floor area per person are an important part of the energy sufficiency policy package. A further target suggested is an adaption of average room temperature (a lowering in the more Nordic countries and a rise in Southern parts of Europe). Attention also deserves the reduction of emissions from individual (car) mobility. However, instead of primarily emphasising the reduction of car mobility emphasis could be given to foster alternative modes of transport. For instance reduced car mobility actually can appear as a side effect of primarily providing better support for more bicycle use as both modes of mobility compete for the same urban space. A proactive support of cycling lanes thus limits the space for cars. Through adequate urban planning combining priority for cycling with sophisticated floor space concepts make up a proper instrument mix for sufficient neighbourhoods (Fischer et al., 2015).

Promising intervention points where sufficiency policies can enfold an above average effect appear in times of live changing events. Children moving out to their own household, divorce or separation of partners, or the death of a partner tend to create phases, during which routines and practices change, sometimes dramatically. At such stages the individual floor area suddenly increases and people are often left alone with more space than before; space they are not necessarily prepared to fill. Such phases therefore provide a promising window of opportunity for policy instruments supporting the move into a smaller apartment or into a co-housing project or the letting of a part of the house or flat (Thomas et al., 2017). From an economic perspective this holds the benefit, that in some cases the departure of a person also has a financial impact on the household budget. From a social perspective people deciding for such steps often intend to avoid loneliness and to (re-)build social ties for the remaining years.

In the following we suggest policy instruments clustered according the usual triad of administrative, economic and informational instruments. To begin with the latter, informational instruments have proved to be the most popular instruments in the context of environmental and sustainability policy

Identification of promising instruments and instrument mixes to promote energy sufficiency

in the past. However, they also showed to have the weakest impact on really changing energy consumption (Lorek et al., 2008). Information does not easily translate to changing behaviour or decision making because people proved to be not as rational as policy making still tend to believe. In addition, too much information focuses on marginal issues like stand by or lighting. Those information campaigns perceived as successful in terms of factual change were often accompanied by further measures. In addition, as long as sufficiency is still linked to renunciation it may too easily raise opposition if public authorities (or political parties) take up the issue in proactive communication. For the time being, awareness rising for sufficiency can expected to be more successful when initiated by civil society organizations, whether established ones or bottom up initiatives.

On the other hand the state has always been in a position to send out signals (Jackson, 2009). It does so through subsidizing norms it considers beneficial to back, or taxing behaviours that it seems wise to restrict, e.g. alcohol and tobacco use. Governments also shape the social context through establishing educational structures and the national curriculum, and the work-leisure balance through wage policy and work week. The government even intervenes in family matters e.g. by creating a policy on paternity leave (Mont & Dalhammar, 2005).

The informational task looks different when it comes to policy levels closer to the citizen. Especially in the municipality or neighbourhood context changes towards sufficiency need hands-on practical and individual information – mainly how to make best use of sufficiency policies established through national or local administrative or economic instruments. Therefore local sufficiency consultancy plays an important role in our instrument set below.

Generally, administrative instruments are among the strongest instruments. They have proven their success in phasing out un-sustainable products and production practices and establishing firm requirements, e.g. on building standards. Economic instruments – on the other hand - have proven good environmental effect, where substitutes are available and some economic incentives are needed to make them attractive on the market. They even work better if the financial incentives are – stepwise or linear – linked to an ecological target; e.g. the higher the energy saving the higher the subsidy. However, equity aspects have to be considered in the design of the measure. Table 2 provides an overview on the identified promising instruments and instrument mixes to promote energy sufficient living. The instruments are briefly describes below.

Table 2 Instruments and instrument mixes to promote energy sufficient living

	Administrative	Economic	Informational
National	<ul style="list-style-type: none"> - adjusting requirements for minimum dwelling size - centralized cap for energy consumption - centralized cap for existing and new living space - moratorium or cap for soil sealing - obligations for bicycle facilities - take back obligations for building 	<ul style="list-style-type: none"> - energy sufficiency funds - property taxation - sufficiency requirements for public loans - tax free basic amount of energy provision 	<ul style="list-style-type: none"> - establishment and financial support for sufficiency consultancy - obligation to report vacancies
Local/regional	<ul style="list-style-type: none"> - Commercial-free public space - Obligatory bicycle lanes 	<ul style="list-style-type: none"> - local investment funds restricted to citizens of the municipality 	Cost free access to municipal sufficiency consultancy, (one stop shop) providing <ul style="list-style-type: none"> - living space advice, - practical support for moving, - access to financial support

National administrative instruments

Adjusting requirements for minimum dwelling size

National or local building codes have over the years oriented their minimum dwelling size requirements more on increasing comfort and luxury criteria than on basic needs. This starts to be contested for various reasons; environmentally motivated sufficiency reasons are not even the most important here but mainly economic or demographic. Considering that dwellings more and more have to fit single or two person households – instead of families as previously – some cities already started to lower their requirements, Oslo, e.g. from 40m² to 35m² in 2005 (Stefánsdóttir & Xue, 2018) or New York City which eliminated its requirement for a minimum apartment size of 37,2 m² (400 ft²) in 2016 (Cohen, 2018).

Centralized cap for energy consumption

To successfully tackle rebound effects as well as energy rising impacts through general economic growth limitations need to be set from outside the economic system: politically by capping resource throughput with a shrinking cap (Spangenberg, 2018).

Various concrete policy tools were developed in the past 5-10 years, to achieve a resource-capped economy. The ‘Energy Budget Scheme’ e.g. a Europe-wide policy tool aims at a sufficiency scale and fair distribution of energy and resources. It is a means to deliver absolute reduction of energy use at the EU level, progressively reducing each year, guaranteeing every citizen access to the same fair share and involving all business and public entities. The scheme aims to cap the EU economy's fuel and electricity consumption in line with the EU carbon emissions targets, and then essentially rationing out the energy available under the cap (Kiss, 2018). Emphasis has to be given here on economy wide schemes to avoid rebound effects (Sorrell et al., 2018).

Another proposal, by the Dutch Footprint Group, introduces a ‘footprint currency’ called Terra. Its objective is a fair global distribution of CO₂ emissions and land use through a cap system which would be lowered year by year to reach a sustainable level within the carrying capacity of planet Earth and to leave enough for future generations. A Dutch design group developed a similar mechanism for the implementation of a quota system (Juffermans, 2018).

Whether a cap needs to be accomplished by personal carbon trading (i.e. carbon markets with equitable personal allocations) (Bertoldi, 2017) is debatable. In any case the alternative to this cap(-and-trade) approaches is the current system of rationing by price with the consequent issue of unfairness where the richest are privileged to get whatever is in short supply anyway (Kiss, 2018).

Moratorium or cap for soil sealing

Through competition among municipalities for taxes and inhabitants new areas are continuously sealed at the outskirts of the cities. This expansion of suburban areas has already proved to co-develop with increasing house size (Ropke & Jensen, 2018; Viggers et al., 2017). To bring this escalating circle to a hold a soil sealing moratorium seems to be a promising solution (Kopatz, 2014, 2016). The instrument was tested in a project by the German Federal Environment Agency. Next to cost saved for new infrastructures such an instrument could set free capacities to develop creative solutions how to foster sufficient living within the existing building stock (UBA, 2016).

Less rigorous than the soil sealing moratorium would be a centralized cap for existing and new living space. This instrument might be accomplished by an economic instrument of tradable permits for soil sealing (Thomas et al., 2017; UBA, 2016).

Obligations for bicycle facilities

Expanding space for non-motorised mobility is a valuable support for citizens. It allows them to move in their neighbourhoods in an emission free way. This is accompanied by co-benefits from better air quality and less noise to even higher likelihood of social exchange. Next to bicycle lanes and car free zones space for bicycle parking and maintenance should also become obligatory for new buildings and in new established neighbourhoods. So far such regulations are solely required for cars.

Take back obligations for building

Sufficiency aspects for homes can also find their place in the context of the circular economy. So far developing settlement areas are mainly a one way process. Closing the circle could be fostered through 'take back' obligations for buildings. Financial and technological planning for the taking back then would have to be established with the building permission. The German mining law can serve as orientation for such an instrument where mining areas have to be re-naturalised after the active period (BMUB, 2016). As a result past mining areas in Germany and the UK look strikingly different.

National financial instruments

Energy sufficiency funds

Energy funds have proved to be a well perceived instrument. Similar to those established for efficiency projects direct financial incentives could also foster sufficient living. Especially in a kick off phase of sufficiency policies specific funds could support refurbishing projects which meet sufficiency criteria in a characteristic and appealing way and thus serve as reference to inspire planner and architects as well as dwellers. An additional interesting tool in this context would provide awards.

Property taxation

An adequate financial instrument targeted at the upper limit is a progressive property tax. Debated at various times in various countries already it is e.g. actively applied in Singapore to dampen real estate speculation (Cohen, 2016). Instead, however, of relating the tax to real estate price as in the existing case sufficiency consideration would link it to the per capita size. Alternatively to a graduated tax could be a luxury tax levied for dwelling above a certain size (Fischer et al., 2015).

Tax exemption or partly reduction of real estate transfer tax on the other hand could make moving more appealing for people living in flats or houses too large for their actual needs. Such an exemption could be applied, for example, in cases where the new flat/house is at least a defined percentage smaller than the old home (Kopatz, 2014; Thomas et al., 2015). Beyond the taxing issues generally limiting the opportunity to capital gains from real estate ownership might be a challenging but worthwhile strategy in the long run (Ropke & Jensen, 2018).

Sufficiency requirements for public loans

In combination or in addition to public credits for energy efficiency renovation (in Germany KfW financing) a similar stream of funding could be offered when sufficiency criteria are met (Steffen, 2013). The most important difference to the actual practice would be the switch in the funding criteria from the m² perception of energy consumption to a per person calculation. This would increase the incentives for compact dwelling, flexible flat size and so on.

Tax free basic amount of energy provision

To clearly indicate that the good life and justice postulate of sufficiency is meant serious, the general provision of a basic amount of energy per capita should be politically supported. An adequate instrument could be a zero or at least reduced tax on a defined minimum amount of energy. High energy prices tend to reduce the energy consumption particularly in less affluent households, and thus such a tax release could help to avoid unintended effects such as fuel poverty (Bertoldi, 2017).

National informative instruments*Establishment and financial support for sufficiency consultancy*

Efficiency consultancy is a requirement established for quite some time already. To ensure that a switch to sufficiency is taken up in broader public adequate information provision needed. This can best be fostered through requirements by national or even EU legislation. In best case such sufficiency consultancy is even supported with a specific budget line.

Obligation to report vacancies

A precondition to better allocate available dwellings to those in search for them is to know about vacancies. This, however, is not necessarily given. Thus an obligatory notification about free dwellings needs to be established through national regulation.

Instruments for the local or regional level

The factual mandate to set up meaningful administrative or economic instruments for sufficiency is less given at the local or regional level. On the other hand this is the level where concrete change appears and where citizen and stakeholders involved in a concrete effort are in need for help and orientation. Therefore information provision gains specific importance in combination with concrete support. In addition communities also have the authority to decide how urban planning impacts their citizens and thus can steer city development towards more sufficient living conditions.

Local/regional regulatory instruments*Commercial-free public space*

A factual adaptation of sufficiency criteria in urban development materialise in the re-discovery of places and public urban spaces as sources for recreation and communication supported by an urban planning that prioritises pedestrians and bikers, offering commerce-free zones without consumption obligations and without advertising. Shortening ways – best assessable for elderly as well – are an important contribution to lower energy consumption (Schneidewind, 2013; Schneidewind & Zahrnt, 2014a; Steffen & Fuchs, 2015).

Obligatory bicycle lanes

Municipalities have specific instruments to priorities bicycling. First of all providing room for cycling (as well as for pedestrian) in most cases automatically reduces the space for car mobility. This puts a clear signal how to (better) move within cities. A further element of support e.g. are the large-scale public bike-sharing systems established over the last years in inner cities, even in as big ones as Paris. It is not only a new service, but also a way of popularising a sufficiency practice and increasing its diffusion (Toulouse, 2017). Another instrument is a mandatory demand of bicycle facilities for parking and maintaining in all new or renovated buildings (Steffen & Fuchs, 2015).

Local/regional financial instrument(s)

Graduated property tax

In countries where property tax are within the authority of cities establishing graduated property tax is an adequate element of local policy making. Criteria then would be similar to the ones on a national level.

Local investment funds

A concrete possibility to support e.g. sufficient living/housing project are local investment funds restricted to citizens of the municipality (Kaltenbrunner, 2014). What could flow into such funds is e.g. money saved for new infrastructure development through a soil moratorium or soil cap.

Beyond that the potential to raise money to financially support sufficiency initiatives is not as large as on the national level with its tax options. Municipality role therefore is more the one of carefully providing sufficiency projects with financial support coming from national sources.

Local/regional informative

Cost free access to sufficiency consultancy

Municipal sufficiency consultancy appears last in this list but in practice builds an easy and required starting point to spread a new sufficiency narrative and at the same time contributes to it. Whether such institutions are set up explicitly under the term sufficiency or if sufficiency aspect become interwoven into regular energy efficiency consultancy is debated at the moment and might depend on concrete situations (Steffen, 2014; Thomas et al., 2015). In any case they could enfold their potential best if they are designed as a 'one stop shop', providing e.g.:

Living space advice

Quite traditionally sufficiency consultants could act as trainers how to best run a sufficient home. This task is carried out through energy consultancy already under the actual concept. The difference is that they could broaden their recommendation to further pointing towards sufficiency potentials.

Practical support for moving

One area for communities of great importance is to support dwelling exchange or, more general, to take care that enough flats of reduced size – and of lower price – are offered. Sufficiency consultancy could become the core contact in times of change for a household to find an adequate, sufficient new home and to receive help in the process of moving. As a basic kick off, an information instrument requiring limited effort would be a local internet based platform for dwelling exchange.

Access to financial support

While we see financial incentives mainly within the national policy package for the practical support and consultancy municipal agencies are closer to the citizen which qualifies them to handed out public money (Thomas et al., 2017). They can better control whether a concrete sufficiency activity meets requirements and they might be of help with filling forms for application. The latter might be of specific relevance for elderly people.

6. Towards an actor centred approach

Developing policies towards sufficiency need courage and mutual support in a joint effort of actors, at all levels of society. Single actors will not be able to achieve much, and if they try, the costs – whether factual or felt by them – might be too high. As elaborated in the previous sections as well as in previous deliverables² it needs the collaboration of different actors to develop the potential sufficiency holds to reduce energy consumption. In a moderated process the different interests and the different needs of the participants have to be discussed and defined and pro and contra arguments of sufficiency solutions need to be openly considered and final solutions agreed upon commonly. For example for the mentioned alternative forms of living creative and structured communication processes can help to build trust between planners and the inhabitants. In the end the acceptance of sufficiency policies and the achievement of sufficiency targets is a negotiation process (Blättel-Mink et al., 2013; Steffen & Fuchs, 2015).

At this final stage, we therefore suggest some sets of concerted action. Exemplified for the targets ‘Reducing m² living space per capita’ and ‘Reducing energy consumption through urban structure’ **Table 3** and **Table 4** indicate which stakeholders offer the most significant potential to induce change. For both targets we suggest different strategies contributing their achievement. While reducing the per capita living space primarily sounds like an individual decision by people or households, influencing urban structure mainly seem to depend on the decisions of policy makers at the different political levels. In fact to develop both into a sufficiency direction requires the interplay of many actors. The relative influence of the different actors is estimated by common sense and were (and further will be) calibrated in various stakeholder discussions. The results are presented by a rough semi quantitative scheme with / = no influence; 0 = little influence, + = significant influence, and ++ = strong/dominant influence³. For a validation of these estimates or even for their quantification, further detailed social science studies would be required.

The first table focusses concretely on the reduction of dwelling area per capita. The strategies concentrate on how to best make use of the already existing building stock. Next to encourage moving into smaller dwellings in case of shrinking family size we suggest actor collaboration for ‘technical fixes through flexible building design. Third we throw some light on potential collaborators to foster social housing projects.

Table 3 Actor matrix for reducing m² living space per capita

Reducing m ² living space per capita									
	Municipalities	Housing Companies	Financial Institutions	Architects and urban planners	National Policies	EU Policies	CSOs	Research	Consumers
social housing project	x	xx	x	x	0	0	x	0	x
flexible building design	0	xx	x	xx	xx	x	x	0	/
encourage moving	x	xx	x	/	0	/	x	0	x

estimated level of influence: / = no relevant influence; 0 = a little influence,
 x = significant influence, xx = strong/dominant influence

² See also deliverable 5.3 ‘Stocktaking of social innovation for energy sufficiency’

³ For the methodology see also Lorek, S. & Spangenberg, J. H. (2001) Indicators for environmentally sustainable household consumption. *Int. J. Sustainable Development*, 4, 101-120’.

Only focusing on the gains of smaller dwellings, however, can obscure the full picture. The commercial and public services used to compensate for less individual space could result in exceeded carbon emissions than the ones saved (Heinonen et al., 2013). Therefore car low neighbourhoods and commercial free public recreation areas build further strategies supporting the target of reducing energy consumption through urban structure. In this context we also consider explicitly options how to make better use of the available building stock respectively the reurbanising land in already urbanized areas to avoid urbanisation of new land (Ferber & Preuß, 2008; Krähmer, 2018).

Table 4 Actor matrix for reducing energy consumption through urban structure

Reducing energy consumption through urban structure									
	Municipalities	Housing Companies	Financial Institutions	Architects and urban planners	National Policies	EU Policies	CSOs	Research	Consumers
Better use of available building stock	xx	xx	x	x	x	x	x	0	x
Car low neighborhoods	xx	x	/	x	x	x	0	0	x
Public recreation areas	xx	x	/	x	x	x	x	0	x

estimated level of influence: / = no relevant influence; 0 = a little influence,
 x = significant influence, xx = strong/dominant influence

The matrices do not claim to be comprehensive, neither regarding strategies nor actors. They mainly represent state of the art debates and like to provide a comprehensive overview about what is possible – or at least thinkable – for the time being. In so far they are more a starting point for an informed broader process than a concrete roadmap. The following tasks or roles are anticipated for the different actors

Municipalities

Municipalities play a crucial role for sufficient housing. At least in theory they have the full sovereignty whether to further grow and seal more soil for commercial or residential areas or to make better use of the available building stock. In practice however, monetary aspects to provide space for further tax payers bring mayors in a competing situation with the neighbouring towns reducing their actual freedom. Therefore they depend on structural support through national or EU policies. It starts with decisions not to seal further soil at the edge of the city. Their possibilities for making better use of the available building stock range from redesign of residential houses to obligations for private house owners. As landlords communities can set examples regarding social housing projects. Also the design of neighbourhoods fall in their sphere of influence from wisely sharing street space between cars, bikes and pedestrians to

Another major direct function municipalities can take towards sufficient living is providing practical help for people looking for adequate living space through complementing efficiency consultancy established in most communities anyway. They are trust worthy institutions to establish sufficiency consultancy and function as a hub where households searching for less dwelling space and those searching for more space and information for vacancies can come together.

On a more structural basis municipality decision makers can significant influence mobility patterns in their cities and towns. This ranges from adequate space for cycling and for pedestrians via the traffic

routing to the explicit declaration of car free zones in combination with easy accessible public transport. This has to be embedded in a quartier management where the needs of daily provision as well as recreation can be satisfied close by. Such areas often appeal people interested in social housing projects which search for elaborated common space willing to reduce the private one.

A final important aspect is the way public space is designed. Open and inviting places for people to meet can enable recreation within cities and thus reduce the need for trips to the outskirts of a town or to the country side.

Housing companies

Housing companies appear to be a major actor when it comes to sufficient living. From the design of flats via the design of the neighbourhoods to services how to individually move into smaller flats while remaining in the well-known quartier all this could be taken up by companies interested to combine service for their clients with sufficiency considerations.

The strength of housing companies is their decision making power often over a large number of buildings. This normally provides them with information over the size of their dwellings as well as the number of inhabitants in these dwellings and so can work towards switches of flats according to factual need of households, best even in the same neighbourhood.

Some, most co-operative companies already link household size and m² size of the dwelling in their contracts. Also physically adopting the inner of their buildings to changing requirements or supporting alternative forms of living (social housing, multigenerational housing) are broadly in their sphere of influence.

Depending on the size of the owned area a recreational, car low living in the neighbourhood can be designed and supported by them in their quartiers.

Financial Institutions

Under the term financial institutions we here subsume a broad range of institutions which can support investment in sufficient living.

An important starting point already is the elimination of barriers for sufficiency projects as the financing of construction. So far they hinder self-organized forms of a more socially and environmentally just housing provision. What is needed are more collective forms of investing, credit cooperatives or other forms of alternative banking which support investment in modest housing and dwellings (Ferreri, 2018; Nelson & Schneider, 2018).

To enforce spatial justice attention also has to be drawn to privatization of land-ownership. The rent extracted from land is continuously becoming more centralized and financialized excluding economically weak inhabitants and functions from central neighbourhoods to the outskirts on the cities. Here as well solutions could come from land ownership by coops, community land trusts, other collective entities (Brown, 2018; Krähmer, 2018).

Public authorities can influence financial institutions e.g. through eliminating mortgage interest deduction or in context of public funding schemes through developing criteria which relate m² dwelling area to person (Brown, 2018).

Architects and urban planners

How appealing sufficiency will be depends not at least on the creativity of design. In the context of housing especially architects and urban planners have to play a role whether in an inviting set up of public recreation areas, low car neighbourhoods or in the concrete planning of a social housing project. Very practically, a flexible setup of flats and houses through removable walls can allow rearranging the size of apartments according to a growing or shrinking demand of a family or

household. This builds one interesting element within the general approach to make better use of the available building stock. To fulfil this role in a better way the remuneration of architects would need some modifications. Until now it mainly depends on the size of an object. Designing smart and sufficient is not encouraged as it results in lower income.

National and EU Policies

As indicated in context of the actors above already – for an adequate shaping of sufficiency options not only consumers but also the various stakeholders themselves need better support and less obstacles through political framework setting.

Regarding building policies between European level and those of the member states boundaries of responsibility are quite floating. Also competences and thus impact of municipalities vary remarkably between countries. Nevertheless, requirements formulated from higher policy levels always shape the possibilities on the ground. Therefore EU and national policies can form corner stones for sufficient living. For example, building regulations hinder sufficiency design and practice in various ways so far and have to be overcome. Useful initiatives would be to allow for more compact housing or an obligation of parking and maintenance space for bicycles and other non-motorised transport in line with – or even above – the requirements for cars. Further element requested include formulating minimum and maximum requirements for dwellings, a restriction of new soil sealing or ensuring that public space is not further privatized or commercialised.

Civil Society Organisations (CSOs)

NGOs have proved to be an important driver of societal change. They have the best capacity to point towards new, contested problems. Besides raising awareness, civil society in sense of engaged interest groups already started to induce practical change in setting up sufficient housing projects. Further on, also associations, e.g. of architects, can work towards changes in the system by turning attention from new construction to sufficiency oriented redesign through awards.

Research

Research has identified the important contribution of housing to the environmental challenges for a while already and new studies emerge at different places how to take up the dwelling and settlement space problem. Dissemination of results as well as further search for solutions are highly requested in this field.

Consumers

Nearly all strategies described in this actor approach are targeted to support consumers in their decision making towards sufficiency. In the end they have to make the relevant step and follow the paths provided by the other stakeholders. Additionally they are relevant through initiating change, participating in societal debates, demand sufficiency measures, exchange on the topic with friends and colleagues as actors and creators of resilient local communities as well as organisers of alternative ways of living enabling sharing instead of competing for space and resources (Hagbert, 2018).

7. Conclusion

In times where the timeslot for reaching EU energy targets and dramatically reducing CO₂ emissions are narrowing sufficiency strategies are required to set a clear framework in which efficiency policies can lead to the required absolute reductions. At the same time sufficiency also intends to ensure equality aspects, namely that minimum standards for a flourishing human live are fulfilled.

An important – but so far neglected – contribution to sufficient lifestyles is an adequate size of dwelling area per capita. While social and environmental science provide us with clear orientation for adequate upper and lower levels it is now necessary to work towards societal debate and factual change.

To overcome the restricted perspective that sufficiency is a purely individual decision the project has proposed policies for the different levels of governance. They rank from *adjusting requirements for minimum dwelling size* and *caps for further soil sealing* on the national or even EU level to the *establishment of sufficiency consultancy* on the local level.

Such policies have to be embedded in activities at a societal level where NGOs raise awareness for the issue and housing companies in collaboration with architects and urban planners develop creative ideas where sufficient lifestyles can flourish in sufficient neighbourhoods.

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