Research Report

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Green Lifestyles, Alternative Models and Upscaling Regional Sustainability

EUROPEAN COMMISSION
European Research Area

SEVENTH FRAMEWORK PROGRAMME

Funded under Socio-economic Sciences & Humanities

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Executive summary

The overall aim of GLAMURS (Green Lifestyles, Alternative Models and Upscaling Regional Sustainability) has been to develop a theoretically-based and empirically-grounded understanding of the main obstacles and prospects for transitions to sustainable lifestyles and a green economy in Europe as well as of the most effective means to support and speed up these transitions in Europe. GLAMURS explored the complex interactions and links among economic, social, cultural, political and technological factors influencing sustainable lifestyles and transformations to a green economy across societal levels (from individual to social, and from micro- to macro-economic levels); it developed and evaluated comprehensive models of lifestyle change at a European level in key sustainability domains, and provided assessments of these models in terms of economic and environmental effects, in order to provide recommendations to decision-makers for achieving a sufficiently-fast paced transition in Europe in line with the objectives established in the Europe 2020 strategy and the Resource Efficiency Flagship Initiative.

In order to achieve these objectives, the project adopted an integrated perspective on lifestyles, looking at them through the lens of time-use and the opportunities and obstacles for adopting sustainable lifestyles afforded by the structure of everyday life. Theoretical conceptualizations that integrated a diversity of determinants of lifestyle choices across disciplines constituted the starting point for in-depth empirical exploration of:

- factors that promote or hinder sustainable lifestyle adoption;
- the interactions between time-use, consumption and wellbeing;
- European citizens´ desires for lifestyle change and their implications for sustainability; and
- the role of sustainability initiatives in promoting sustainable lifestyles, wellbeing and a green economy.

Seven European regions were chosen as case studies, together with a diversity of sustainability initiatives spanning different issues, ambitions and lifestyle domains. Multi-method empirical research using network mapping, in-depth interviews, focus groups, and questionnaire surveys targeted six lifestyle domains, which were chosen due to their high contribution to our environmental footprints: status and use of homes, energy use, mobility, food consumption, consumption of manufactured products and the work-leisure balance. The following regions and embedded initiatives were studied (see Figure 1):

- Aberdeenshire (Scotland) with the Work-Smart Initiative (domain of work-life balance);
- Banat-Timis (Romania) with 3 ecovillages (Stanciova, Aurora, Armonia Brassovia) covering all six domains of GLAMURS;
- Central Germany with the social movement of the Transition Town Halle;
- Danube-Bohemian Forest (Austria) with two initiatives, "Bioregion Mühlviertel" (organic food consumption and production) and climate and energy model region (domains of energy, housing and mobility);
- Galicia (Spain) with two initiatives: Zocamiñoca (a food consumption cooperative) and Amarante Setem (domain of consumption of manufactured products through activities aimed at promoting sustainable textile production, especially in clothing);
- Lazio (Italy) with the food cooperative Co.r.ag.gio.
- Rotterdam-Delft-The Hague (the Netherlands) encompassing two types of initiatives: three repair cafés and an energy cooperative (Vogelwijk Energiek).

Coupled with an in-depth understanding of determinants of sustainable lifestyle choices, the project focused on dynamics of lifestyle change. Among these, it looked at the development and evaluation of scenarios for a sustainable future and the interaction between individual lifestyle choices, social dynamics of lifestyle adoption, and the effects of macro-economic trends on achieving a successful transition to a green economy. Scenarios for the future have been co-produced with stakeholders in the seven regions and then tested using economic and agent-based modelling. These interactions between bottom-up lifestyle changes and dynamic economic and policy changes have been analysed at different stages of sustainable lifestyle spread and adoption, which allowed us to unveil social and economic tipping points, dynamics of lock-in, and to formulate and test policy recommendations that would place European societies onto a path of sustainable lifestyles and green economy development.

Finally, the project developed an integrated framework for knowledge co-production that allowed for the development of practically- useful knowledge, contributed to regional capacity building and the creation of spaces of interaction between citizens, business, and government actors, that could act as sites for the co-shaping of solutions for a sustainable future.

The present research report is structured as follows: the first section presents a summary of project context and objectives. Section 2 summarizes the main results of the project by: presenting the main insights from the empirical research carried out in the regions on obstacles and prospects for sustainable lifestyles and a green economy (Section 2.1); evaluating possibilities for upscaling by testing pathways and scenarios for transitions to a sustainable Europe using scenario development and multiple modelling methodologies (Section 2.2.); and by assessing the environmental impact of lifestyle choices and upscaling the environmental effects of present and future envisaged lifestyles (Section 2.3). Finally, section 3 focuses on the main activities targeting scientific and societal impact through the project´s knowledge co-production and dissemination strategies.

Figure 1. Overview of the case study regions and their initiatives in the six domains

1 Summary of project context and objectives

During the last decades accumulating scientific evidence has shown that our patterns of intensive resource use together with GHG emissions are leading to increasing resource scarcity, loss of biodiversity and climate change with its numerous and disastrous effects. Existing unsustainable patterns of consumption and production in the affluent world are responsible for these complex and connected problems, and finding the appropriate pathways to sustainable change has become a priority for European citizens and policy-makers. Furthermore, the recent economic crisis has led to a deep recession in many parts of Europe and pointed to the need for a profound transformation of our economic and governance institutions in a direction that is smart, sustainable and inclusive (Europe 2020 Strategy). In a world in which other regions possess the majority of raw materials, the European Union is confronted with the challenge of becoming a "knowledge based, resource efficient and low-carbon economy", while at the same time "having the capacity to improve human wellbeing, provide decent jobs, reduce inequalities, tackle poverty and preserve the natural environment" (Call text: SSH.2013.2.1-1).

Affluence increases in the global North have led to patterns of increased resource consumption. Ways of living characterized by patterns of intensive consumption remain central to our conceptions of human wellbeing, in spite of accumulating evidence showing that materialism imposes a high price on individual wellbeing (Kasser 2002). Climate change, together with the failure of materialistic lifestyles to deliver wellbeing (as evidenced by indicators of physical and mental health, happiness and subjective perceptions of life satisfaction) have led to a questioning of assumptions underlying current societal and economic arrangements. Lifestyles characterized by intensive consumption are harmful for the environment, but they have also failed to deliver on the promise of happiness and a more leisurely life. Instead, European citizens experience increasing time-pressure and less wellbeing, while our overall material affluence and ecological footprints are increasing.

The equation of economic consumption with well-being has also led to the primacy of measures such as GDP in public policy (Jackson, 2005). There have been considerable advances in decoupling economic growth from environmental impact through strategies for improving resource efficiency on the supply side. These have included all types of eco-efficiency strategies together with mechanisms for cleaning the production processes of consumption products.

Cleaner production processes have contributed, however, to rebound effects, which involve increases in the levels of actual consumption, thus potentially cancelling out the positive effects of cleaner production processes (Hertwich, 2005). It has thus become clear that these strategies need to be complemented by changes in consumption patterns as well as by reductions in levels of material consumption (Princen, Maniates & Conca, 2002).

Efforts to reduce environmental impacts should focus on those consumption categories identified as most important from an environmental perspective (Tukker & Jannsen, 2006; Hertwich et al., 2010). Significant improvements in these categories can be achieved through a shift towards alternative consumption and production systems with a lower environmental impact, which would further drive the supply-side to match these alternative patterns of consumption with new business models (Tukker et al., 2010). The impact of both changes in lifestyles and resulting changes in the supply side on the distribution of labour and the balance between work and leisure need to be further assessed, as there is a general concern about the negative effects that patterns of reduced consumption would have on employment in Europe.

The overall aim of GLAMURS (Green Lifestyles, Alternative Models and Upscaling Regional Sustainability) has been to develop a theoretically-informed and empirically-grounded understanding of the main obstacles and prospects for transitions to sustainable lifestyles and a green economy in Europe as well as of the most effective means to support and speed up these transitions. It developed *integrated models of lifestyle and economic change, by taking into account the dynamics of lifestyles, the conditions under which economic systems are transformed and the policies that might enable a sustainable transformation*, in order to support policymakers, businesses, and citizens to make informed decisions on the way towards a sustainable future.

GLAMURS went beyond disciplinary understandings of determinants of sustainable lifestyles or conditions for transitions to a green economy and integrate knowledge across micro- and macro-economics, psychology, governance theories and industrial ecology, and across different scales, and thus provide a comprehensive account of the interplay of factors influencing adoption, diffusion and mainstreaming of sustainable lifestyles, and show how this interplay produces certain economic and social tipping points. It also aimed to test a series of policy interventions that took into account the existence of such tipping points and propose a set of policy recommendations based on these integrated assessments. Pathways to change thus described transition stages for multiple domains and social actors, as well as tipping points and feedback loops among transitions stages and levels.

In order to meet its objectives, GLAMURS has:

- *Integrated theory on the complex relationships between institutional, social, economic, political, technological and environmental determinants of lifestyles and lifestyle change,*
- *Developed models of lifestyle change that consider different pathways to achieving transition (initially developing in niches, then becoming regimes and landscapes, as defined by theories on transition), and*
- *Tested models of transition through a combination of empirical research and simulation approaches.* ***Simulations included: micro- and macro-economic models and interactions between them, as well as agent-based models.*** *The models tested different pathways to sustainable lifestyles and a green economy through different approaches to policy.*

GLAMURS combined insights from psychology on dimensions such as people´s identity, aspirations, motivations and social norms with economic ones about the role of technological developments and international markets in this comprehensive study of transitions to sustainability. Through ***multi-method empirical research*** (García-Mira *et. al.*, 2012; García-Mira *et. al.*, 2016), including both quantitative (surveys) and qualitative methodologies (focus groups, network mapping, in-depth interviews), we explored the complex array of factors influencing (un)sustainable lifestyle choices, and also zoomed in on members of sustainability initiatives as early adopters of sustainable lifestyles, to understand what motivates their engagement and how it impacts both their wellbeing and environmental footprint. Empirical research on these factors ***was carried out in seven European regions and six lifestyle domains***.

Our systemic and integrative approach also included ***participatory visions of the future***. Through the method of back-casting (García-Mira *et. al.*, 2016; García-Mira and Dumitru, 2014), stakeholders in seven European regions co-developed a series of visions of the future in which sustainable lifestyles and economies became the norm in each region, and described potential pathways to reach them.

Dynamic transformations towards sustainable lifestyles and green economies are then explored and assessed using a ***combined modeling approach***. The three modeling approaches used– micro-, macro-economic and agent-based modeling – allowed us to explore the interaction between individual, community, and global economic dynamics, and the effects of different policy options at different stages of transition.

Micro-economic models of individual behavior governing lifestyle choice and the replication of choices within the population were developed. The ***macro-economic modeling*** used tools from growth theory and ecological economics to explore how market and policy responses to changes in lifestyles might support or hinder transitions to sustainable lifestyles and a green economy, to investigate trade-offs between time-intensive and energy intensive activities within the framework of long-term macro-economic trends, and carried out tests of different macro-economic policy options.

Based on the work of the micro- and macro-economic modeling and case-study research, ***agent based models*** were designed. It entails developing a micro-world for the agents to inhabit and interact in, and in which different policy scenarios and their performance can be simulated.

Also, GLAMURS has sought to provide insights into which lifestyles are more or less sustainable from a multi-dimensional resource and environment perspective. Household environmental impacts have been evaluated in an integrated modeling framework, starting from a global macro-assessment (inter-country differences) through a regional assessment with improved spatial detail (inter-regional differences within Europe) to individual- and group-level assessment of environmental impacts. Carbon footprint calculations of the GLAMURS regional and initiative samples have enabled the analysis of factors influencing consumption patterns and lifestyles. Furthermore, the impact mitigation potential of large-scale lifestyle changes has been modeled and assessed to provide insights about the potential pathways to future desirable outcomes.

Finally, the project created communicative contexts on European and regional levels to investigate how such transitions are possible with a diverse range of actors. Given that mitigating climate change and finding solutions to our complex socio-economic and environmental problems is a shared problem mired in uncertainties, we adopted the vision ***that knowledge and solutions need to be co-produced***. Strategies for the co-production of knowledge have been embedded in the project transversally, and included, among many other activities, organizing workshops with European and regional policy-makers, promoting exchanges among sustainability initiatives, and building an ontology – a sophisticated cognitive tool designed to evaluate the conditions promoted by the project and map how we come to know what we need to know about necessary action in transition to sustainability.

2 Description of main results/foregrounds

2.1 Main obstacles and prospects to sustainable lifestyles and a green economy

2.1.1 A new conceptualization of lifestyles

The project adopted an innovative and systemic approach to lifestyles, considering them to be patterns of time use in daily life domains and contexts, that take place in given locations and have associated consumption patterns, rather than a simple sum of independent behavioral choices. How people structure their everyday life, how they make decisions regarding their work, home and leisure life, and what contributes to their wellbeing have important consequences for sustainable lifestyles. Instead of focusing on European citizens´ consumption patterns and attempting to change them, a piecemeal approach that has not delivered expected results, we have inquired into how the ways in which everyday life is organized might actually create obstacles, but also possibilities for change. People organize their activities and tasks in different ways; experience acceleration or, on the contrary, time affluence, and these experiences generate feelings of stress and unhappiness/lack of wellbeing, and induce specific behavioral adjustments (e.g.: eating out because one does not have time to cook at home; taking the car for short trips in order to drop kids to school and stop at the supermarket on the way back from work etc.), with implications for sustainability.

GLAMURS started from the recognition that a certain level of consumption is a constant in human life, and a medium for reaching certain goals or performing any sort of activities. However, consumption has been conceptualized as the ´infrastructure´ through which certain activities are performed, in order to reach certain goals (Jalas, 2005). An alternative understanding of lifestyles was thus proposed, in which everyday activities and consumption are bundled together in an observable structure of everyday life, which in turn possesses individual and social symbolic connotations. Choices regarding time-use and the reasons behind them became the focus of inquiry. Separating material consumption from those choices allowed us to look at potentials for different patterns of resource use and material consumption while pursuing the same goals for the same motives – thus generating a space for societal reflection on sustainable lifestyles and wellbeing.

2.2 Factors influencing sustainable lifestyle choices: main results from seven European regions

An in-depth exploration of factors influencing sustainable lifestyle choices was carried out, through ***focus groups, in-depth interviews and survey research in seven European regions***. In order to shed light on factors that might promote or hinder sustainable lifestyle choices, we looked at both regular citizens and members of sustainability initiatives. As the trade-offs between time-use and consumption have not been extensively studied, our focus was on the exploration of the subjective experiences of such trade-offs, which included the experience of time affluence in everyday life and its relationship to sustainable behaviour and wellbeing, in order to identify those lifestyle changes that might hold the highest potential to both reduce environmental impact and promote wellbeing. We first explored to what extent different European regions experience decreased time affluence, what determines such a phenomenon,

and what its main implications for the adoption of sustainable lifestyles are. Secondly, we explored what psychological factors might play a role in environmentally-relevant lifestyle choices in the domains GLAMURS has focused on: food consumption, status and use of homes, energy use in homes, mobility and consumption of manufactured products. Thirdly, we delved into the lifestyle changes that might be desired by citizens in the different regions and analysed their main psychological determinants and their sustainability relevance. Finally, we analysed the role of sustainable initiatives, in terms of the model they provide and the discourse they generate, in adopting sustainable lifestyle choices.

2.2.1 The experience of time affluence

Time affluence is the subjective appraisal of having sufficient time to do things that are personally important. Previous research has pointed out to the fact that material affluence does not necessarily bring happiness, although this is one of the assumptions underlying consumerist lifestyles. It is an important predictor of subjective wellbeing (Kasser & Sheldon, 2009). Some results point to the idea of time affluence bringing happiness, for example, by showing that work hours are negatively correlated to subjective wellbeing (Kasser & Brown, 2003). It has been suggested that time poverty affects people´s civic engagement, physical health and family involvement (De Graaf, 2003).

We explored the experience of time affluence through focus groups. Results across the seven regions show that the amount of time dedicated to work and out-of-work activities, respectively, can influence our perceptions of time affluence and our experienced levels of satisfaction and wellbeing. However, it is not only the objective amount of time that work takes that influences perceptions of time affluence, but also the nature and quality of work, which is experienced as being too draining and tiring, and leads to a sense of low-quality time being spent on work.

In addition to structural barriers to sustainable choices (e.g.: lack or inefficiency of supporting infrastructure), time scarcity and the lack of a proper work-leisure balance can be obstacles to sustainable lifestyle changes, especially if people feel the need to comply with social trends and norms (García-Mira and Dumitru, 2014), pressuring towards unsustainable choices (e.g., cultural values or government policies favouring intensive material consumption). On the contrary, the experience of time affluence (i.e.: having the proper time to do what one finds important), and the perception of being in control over one's own organization of work and leisure time, increase the likelihood that individuals are able to pursue the more sustainable option when taking daily life choices. Other notable contextual barriers involve conflicting personal roles (e.g. work responsibilities, family duties, personal initiatives) that prevent people from investing their time and resources in the pursuit of sustainable goals, aspects related to production (where a tendency for overproduction and avoiding obligations detracts from sustainable aims), and the fact that some sustainable options are rather ineffective (e.g. public transportation lacks punctuality) or difficult to access (e.g. bureaucratic obstacles for installing solar panels).

Focus groups carried out with both regular citizens and members of sustainability initiatives in the seven regions have shown that the subjective experience of time seems to be more influenced by the level of autonomy in organizing one´s daily life in ways that are coherent with one´s values and priorities. As European citizens in all regions generally have work schedules that oscillate between 30 and 40 hours a week, it is not an increase in the objective quantity of free time that would make a difference, but ***rather the increase in personal control and autonomy over the organization of time and in creating the conditions that would lead to experiencing both work and choices of leisure time as meaningful***. Having the autonomy to choose how one uses time is emphasized by most regions, thus suggesting that this feeling of personal control and self-determination might be more important than only having free time per se. Autonomy, however, is not necessarily proportional to job flexibility, as the latter can still be accompanied by high demands on time and actually contribute to higher levels of time scarcity, by blurring the boundaries between work and leisure.

The importance of personal autonomy over the organization of time and its positive effects on wellbeing are confirmed by members of sustainable initiatives across Europe, who, independent of the type of initiative, emphasize that involvement in them has increased their personal satisfaction in part due to the increased autonomy over the organization of time. Members say, for example, that ***time is experienced as sufficient when work is perceived as play and when there is variety and flexibility at work.*** Another important factor that accounts for increased perceptions of time affluence, as well as higher levels of satisfaction has to do with ***meaningful relationships and higher involvement in the local community through higher integration of environmentally-friendly behaviour in current lifestyles*** (e.g. cooking healthier food, moving one´s residence to a more natural setting, implementing new "green" technologies etc).

We also inquired into the relationship between time-use and other barriers of and drivers to sustainable lifestyles, and looked at how this interaction plays out in the different lifestyle domains.[1] By far, the most notable lifestyle domain in terms of drivers for sustainable choices is the domain of food. The category is well represented in all of the case study regions, indicating that for most focus group participants the choice for healthy, environmentally-friendly and sustainable food options represents a strong concern, but is also relatively readily accessible and facilitated. Participants from all regions praise the value of cooking and having meals in the company of others, stressing the benefits in both health and meaningful relationships. Food consumption is seen as a domain where time affluence is particularly important for both sustainable behaviors, as well as increased personal and social wellbeing, as it facilitates meaningful relationships. ***The activities of preparing food, eating it in a group or a larger community as well as taking care of community gardens*** are seen as having a wide range of sustainable benefits, from saving time to actually improving the enjoyment of the food itself. Community gardens where people grow their own food are proposed as a good example of combining the need for connection and healthy communities and that of getting high quality food from the region.

A close second is represented by the domain of mobility, where people consistently outline the various benefits and uses of sustainable and environmentally-responsible transportation options, as a viable alternative to conventional over-reliance on car use. For all case study regions, there is much appreciation expressed for sustainable mobility alternatives. One of the most notable recurring praises – mentioned in most regional focus groups – describes the satisfaction of experiencing the time spent commuting through alternative means (i.e. mostly anything other than driving) as "time for myself" – an opportunity to relax, to exercise mindfulness, or to get a head start on various activities on one's agenda.

Elements of urban planning are mentioned in several cases as barriers, and the need to plan cities in order to allow for sustainable and time affluent lifestyles is mentioned often (e.g. reducing distance to necessary facilities, improving availability of alternatives or accessibility - especially in terms of sustainable mobility). Another very consistently mentioned barrier refers to the comparatively high financial costs of sustainable alternatives, whether this involves purchasing particular products, implementing certain technologies or adopting different behavioral patterns. This is especially relevant for the domains of food, mobility and energy.

1 For a more detailed description of research results, please see Deliverable 4.2 of the GLAMURS project (Dumitru et al., 2015), available at www.glamurs.eu.

2.2.2 Determinants of sustainable lifestyle choices, desired lifestyle changes and wellbeing

Comparative analysis of survey results in the seven regions show that sustainable choices are shaped by psychological characteristics such as pro-environmental self-identity, environmental self-efficacy, personal aspirations, perceptions of neighbourhood quality and social norms. Pro-environmental identity refers to a person´s self-definition as one who cares for the environment (Whitmarsh and O´Neill, 2010) and is influenced, among other things, by our past sustainability-related behaviour. This means that the more we see ourselves performing behaviors that are sustainable, the more we strengthen this component of our identity, which in turn leads to more pro-environmental behavior. ***Facilitating opportunities and access to sustainable lifestyle choices can be fruitful avenues towards the adoption of sustainable lifestyle choices.***

Self-efficacy has been defined as a person´s evaluation of the level of personal resources, knowledge or skills to attain a goal (Bandura, 1997) or to perform a certain behavior (Ajzen, 1991). It is considered a key aspect of a person´s sense of competence, related to a sense of personal agency and self-worth or self-esteem (Bandura, 2000). In specific situations, self-efficacy reflects a perception of the person´s ability to act in a given way, considering perceptions of situational possibilities. A strong sense of self-efficacy is related to more sustainable lifestyle choices in most regions.

Aspirations can be defined as sets of goals that motivate behavior (Grouzet et al., 2005). Previous research has identified four categories of aspirations: intrinsic, extrinsic, self-enhancing and self-transcendent (Ryan & Deci, 2000; Grouzet et al., 2005). Our results show that intrinsic and self-transcendent motivations, such as those for community, affiliation, self-acceptance or spirituality support sustainable lifestyle choices (e.g. sustainable food purchase, not wasting food, recycling behavior etc), while extrinsic ones, such as financial success or popularity are related to unsustainable choices. Hedonic aspirations (which belong to the self-enhancing category) can influence sustainable lifestyle choices either positively or negatively, depending on the positive or negative associations that are culturally and socially encouraged for particular lifestyle choices. As sustainable mobility and sustainable food choices are considered pleasurable, hedonic aspirations tend to influence behaviors in this domain in a sustainable direction. However, hedonic aspirations are also related to higher carbon footprints. This supports the view that consumerist lifestyles are associated with "making it" in life, and those holding extrinsic aspirations are more likely to make choices that are consistent with a consumerist lifestyle.

Perceptions of neighborhood quality are important for some types of lifestyle choices but not others. For example, they are a significant predictor for recycling behavior. This can be explained by the fact that recycling is normally a neighborhood activity, in the sense of being performed within that local context and physical space, and requiring the cooperation of neighbors if the common space is to be kept clean and well-ordered. Furthermore, perceptions of neighborhood quality are likely to stimulate closer community contact and ties, which has been emphasized in the focus groups as a driver of sustainable lifestyle choices. ***Government policy can significantly influence neighborhood quality, thus also supporting pro-social behavior***.

Besides factors that influence actual lifestyle choices, we asked the question of what influences desired lifestyle changes. We thus first aimed to understand if changes that might be related to a sustainable lifestyle are desired or not, and also whether the trend might be going in the opposite direction. Based on the focus group phase of the regional research, we defined a series of desired lifestyle changes that were spontaneously mentioned by participants to the focus groups in the different regions, including sustainable and less sustainable ones. Desired lifestyle changes were divided into those referring to ***changes in patterns of time use***, where participants included: spending more time volunteering in local communities; more time with people they care about; more time in nature; and having a slower pace of life even if it means earning less income; and those referring to ***changes in consumption***, where the changes included were: buying and consuming only those things that I need; spending more time traveling, and pursuing convenience and comfort at the expense of time affluence.

It should be noted that desired lifestyle changes that were spontaneously mentioned by participants in the regional focus groups tended to go in the direction of time affluence and sustainable consumption: having more time for spending time in family and community activities as well as in nature, and adopting sustainable patterns of consumption, in ways that allow for less income to be needed and more sustainable choices to be embedded in

everyday life. These types of lifestyle change have potentially far-reaching implications for well-being, social cohesion, and environmental sustainability.

Finally, neighborhood quality and time affluence exert a key influence on wellbeing in all cases. Being satisfied with one´s place of living and one´s neighbors seems to be an important part of our cognitively construed perceptions of overall satisfaction, as well as our general sense of health and vitality. The role of time affluence for well-being has previously been signaled (Kasser & Sheldon, 2009). However, previous research was limited to the American context, where labor regulations include higher number of work hours and thus presumably less time available for leisurely pursuits. The research reported here shows that time affluence is an important dimension of wellbeing in other cultural and regulatory contexts as well, such as the European regions included here.

In general, personal aspirations tend to play an important role for desired sustainable lifestyle changes. Intrinsic aspirations (for community and self-acceptance) positively affect these wishes for change, while extrinsic aspirations (popularity, financial success) lead to an inclination to trade time affluence for comfort and convenience. Aspirations for spirituality also play a positive role, while aspirations for hedonism seem to play either a positive or a negative role, depending again on the regional context. Extrinsic aspirations clearly play an important role for being willing to trade time for having comfort and convenience, and are negatively related to the desire for a slower pace of life.

Neighborhood quality is also a significant predictor of most types of desired sustainable lifestyle changes, showing that the neighborhood can be ***the most appropriate level for policy interventions targeting sustainable lifestyle changes***. This is also supported by the demonstrated importance of this particular dimension for wellbeing. ***Desiring to spend more time in one´s local community can lead to more social engagement and closer community ties thus favoring social cohesion. It can lead to the flourishing of local services and thus local economies. It can support reductions in environmentally-harmful behaviors such as travelling long distances for leisure***.

A complex picture emerges from the data. Given the fact that time dedicated to work is within a similar range in all European regions, absolute reductions in working time, although they do make a difference for subjective perceptions of time affluence over a certain threshold, do not seem to be the most promising pathway to achieving wider adoptions of sustainable lifestyle changes and increased wellbeing. Time-use satisfaction is not only dependent on the type of activity - as traditional models have argued - but also on the degree of engagement in said activity. ***Thus interventions targeting higher autonomy and engagement in work and out-of-work activities, and facilitating higher levels of personal control over the organization of time could achieve more.***

General desired lifestyle changes in different European regions ***tend to go in a sustainable direction.*** However, our current economic models tend to encourage "work and spend cycles" (Schor, 1992) and not time-affluent, high voluntary engagement and flexible income-earning lifestyles. Early adopters of sustainable lifestyles across different European regions find it difficult to ensure a minimal degree of economic stability when making these choices. Also, it is worth noting that desired sustainable lifestyle changes have less to do with personal norms, or feelings of moral obligations to act pro-environmentally, and more with intrinsic and self-transcending aspirations, which supports the view that ***taking an integrated and organic approach to sustainable lifestyles that bases sustainability interventions on an understanding on factors also promoting higher wellbeing could be more effective in promoting change***. Furthermore, higher engagement in community activities and the possibility to spend more time engaged in sustainable activities and sustainable consumption are experienced as meaningful and as a source of personal and relational wellbeing. ***Facilitating volunteering within local communities and regular engagement in sustainable activities would both have wide-ranging environmental and social benefits.***

The food domain emerges as particularly relevant in terms of drivers for sustainable choices. What is most noteworthy from a trans-regional standpoint is the fact that food-related activities are associated with people coming together, sharing their time and space with one another, as part of an alternative approach to strengthening interpersonal bonds and making communities more sustainable. Activities around sustainable food production and consumption are experienced as health- and well-being-enhancing, as promoting closer social ties and as supporting environmental sustainability objectives. ***Food-related community activities can thus be an interesting entry point for promoting transitions to sustainable lifestyles.***

Finally, sustainable initiatives seem to promote greater wellbeing and environmentally-responsible behaviors that go beyond the lifestyle domain they target. Effects of joining such initiatives turned out to be overwhelmingly positive. Their influence also extends beyond members, in promoting sustainable lifestyle choices in the regions studies through the sustainable options they make available through their services. ***European policies hold great potential for promoting a sustainable lifestyle with a strong emphasis on personal wellbeing, by supporting the development and expansion of such initiatives, and the creation of a network that can provide the initiatives with opportunities to interconnect and collaborate***.

2.2.3 The role of sustainability initiatives in the adoption of sustainable lifestyles and transitions to a green economy

We investigated 14 sustainability initiatives in seven case study regions across Europe in order to advance our understanding of important aspects of membership in such initiatives, including drivers and barriers, effects on wellbeing and on the members' environmental footprint, as well as the potential to support the adoption of sustainable lifestyles and the transition towards a sustainable society. Figure 1 in page 7 shows an overview of the initiatives studied in each region.

These initiatives present a high diversity. Some have a local and others an international focus; some have a desire to stay small, others aim to grow; some work towards economic objectives others focus more on social and environmental values; some have a high social embeddedness in local communities, others have a preference for being a rather closed unit. They cover six lifestyle domains that are relevant for sustainability: work-leisure balance, housing, food consumption, mobility, energy use, and the consumption of manufactured products. Most of the initiatives are bottom-up movements, one is government led and two are of a hybrid character (the government and civil society together with intermediaries developed them jointly). Cases include both comprehensive lifestyle change initiatives (e.g. transformations of all aspects of lifestyles) as well as issue-based initiatives (e.g. transformation of energy sources and end-use patterns of behaviour) with potential implications for sustainable lifestyle transformations.

We found that citizens with high levels of overall social engagement, perceived self-efficacy and environmental identity are more likely to engage in sustainability initiatives, while citizens with a high technological innovation attitude and high values for conservatism and self-enhancement were less likely to do so. We also find that a desire for meaningful social connection drives involvement in sustainability initiatives, beyond pro-environmental motives. Such a social motive appears to be primary in reasons for engagement.

Members of sustainability initiatives show high levels of wellbeing. They reported that the main source of their life satisfaction is intimately linked to membership of their initiatives. Often reported factors are social and personal aspects, such as getting to know like-minded people, expanding one´s social network and experiencing personal growth, which contribute to feelings of joy and gratitude. However, sustainability activists also experience frustration due to the limited impact of their action in the light of global challenges. Negative and positive impacts on wellbeing are sometimes interlinked. Negative effects on wellbeing in the beginning turned out to be only temporary, and overcoming this phase, resulted in an increase in wellbeing.

Not only pro-environmental motivations but also social and wellbeing motivations are relevant to join an initiative. Members expressed discontent about the limited progress in the governance of sustainability, and we found that these people develop their pro-environmental behaviour over a longer period of time, in which their membership is one step in their journey towards sustainability. Thus citizens engaged in initiatives already have rather sustainable lifestyles when they become members. Given their experience with attempting to live a sustainable lifestyle, they are also very knowledgeable regarding the main barriers to such a lifestyle. While regular regional citizens might sometimes use perceptions of barriers as ways to justify inaction, we found a clear difference between them and members of sustainability initiatives, with the later endorsing a radical ethic of personal responsibility and rejecting self-indulgence. Delving into the barriers they perceive when attempting to live a sustainable lifestyle has provided us with a wealth of contextualized information that can be used by policy-makers in devising appropriate strategies for transitions to sustainable lifestyles. In the following box we highlight an example of the main obstacles or hindering factors for a more sustainable lifestyle in the different domains focused on by GLAMURS domains (mobility, energy, food, housing, consumption), as they emerged from the perceptions and beliefs of the participants to one of our case studies, promoting a comprehensive transition to sustainable lifestyles (members of an "ecovillage" initiative in Romania).

Hindering factors to a more sustainable life in different domains expressed by participants to the Romanian case study

Mobility:

The main hindering factor for more sustainable mobility choices (for example car sharing) is related to practical impediments (for example, there is nobody available with a car to share), especially when many trips are required (e.g. for doctor's appointments, taking the kids to school and extracurricular activities).

Energy:

Acquiring institutional support and resources for free renewable energy production requires considerable time and effort; in the absence of quick results people get discouraged or withdraw their support to sustainable initiatives.

Food:

The main obstacle refers to the high price for organic food and to the difficulties in acquiring in-depth skills for the practice of permaculture (which is a mainstay in most ecovillages and other similar intentional communities).

Housing:

The main obstacles are exemplified by beliefs of being criticized by friends and relatives for moving too far away or "isolating" oneself, and by the fact that houses in an ecovillage might have inefficient heating systems or less comfortable facilities (power outages, no heating, no hot water, etc.). Also, it might be difficult to find a land plot to purchase fitting the needs of an ecovillage (suitable surface, proximity to cities, road access etc.); finally, resources, construction supplies and construction equipment are hard to procure, and it takes a lot of time and effort to host and manage many volunteers and/or visitors.

Consumption:

The lack of manufacturing facilities (hemp smelting, weaving and spinning sites have been destroyed, sold or abandoned), the lack of institutional interest and support, and the negative preconceptions regarding hemp cultivation (e.g. growing hemp to make drugs) are referred to as the bigger obstacles to more sustainable consumption in an ecovillage.

Initiative members provide role models that need to be supported and encouraged. For instance, policy interventions can set better conditions for membership of initiatives, for development of initiatives, and remove barriers to sustainable lifestyles. The choices, principles, values (self-efficacy, autonomy, self-acceptance, sense of community, sufficiency) and social norms underlying membership could be much better integrated in all relevant policies. Governments should initiate public and political debate on the economic logic constraining sustainable lifestyles (e.g. socially embedded growth vs green growth). Enabling broad engagement and facilitating access to opportunities, spaces and resources are essential ingredients in facilitating their development.

As mentioned already in the previous section, being involved in activities that we perceive as sustainable in turn helps us develop identities that conceive of acting for the environment as an integral part of our self-definition, which in turn lead to us making more sustainable choices, thus creating a virtuous loop for sustainable change. Sustainability initiatives also provide good examples of sustainable lifestyle models as well as of community and societal engagement. They can be seen as platforms to practice sustainable behaviours. However, as they are still a minority, attracting only a small share of the population, they cannot enact sufficient change at sufficiently short time-scales on their own.

In order to reach the critical mass required for sustainable lifestyles to become the mainstream, governance support is needed. Among the suggestions already given, rules, regulations, incentives to facilitate the adoption of sustainable lifestyles should be set and measures and instruments constraining sustainable lifestyles removed. The connection of bottom-up initiatives with government programs can support their upscaling. Intermediary players can help trust to develop between sustainability initiative members and policy makers and can mediate between both levels. Examples for intermediary players are LEADER managers, local agenda representatives and regional development agencies.

A case study exchange workshop organized within the GLAMURS project has led to summarizing a series of needs sustainability initiatives have, in order to develop their activities and role in promoting sustainable lifestyles further:

- more dialogue, exchange and trust-building between research and practice, between scientists and practitioners of sustainability;
- better facilitation of opportunities and spaces for communication across Europe;
- better networks of sustainability actors and
- documenting and sharing cases of good practice and success.

For example, the German transition town group in Halle/Saale and the Galician sustainable food cooperative Zocamiñoca have pointed to the fact that members of sustainability initiatives expressed a great amount of trust in science, a hope that scientists could help solve some of the great sustainability-related challenges that humanity is currently facing, and a strong willingness to cooperate and co-produce knowledge with scientists. By contrast, trust regarding the capacity of policy-makers to support sustainable lifestyle transitions was very limited, combined with a critical attitude towards top-down approaches to policy-making at local levels.

We therefore recommend letting trust evolve through elaborated transdisciplinary research projects, but also by explicitly re-building trust between local actors, through appreciation of local efforts and co-creation of an enabling environment, which helps individuals get together and expand sustainability efforts.

2.2.4 Individual perspectives on changes towards sustainable lifestyles among engaged citizens

Psychological studies looking at the empirical gap between pro-environmental values, attitudes, or intentions and pro-environmental behaviours have largely neglected the role of motivations that yield a particular decision or behaviour. Using semi-structured interviews with members of sustainability initiatives, we looked at the potential of motivations to contribute to the aforementioned gap. We focused on situations of supposed motivational dilemmas by asking "Have you ever experienced situations in which you knew what would be the appropriate sustainable behaviour and you would have been able to conduct that behaviour, but you still opted for a less sustainable behaviour? How did you deal with it?"

Such situations were reported by almost all interviewees. Two main types of responses could be distinguished: a ***"closure approach" and a "process approach".*** The former entails dealing with the dilemma by reducing the relative importance of the pro-sustainable motivation, for example through justification or downward social comparisons. This approach mostly led to the more unsustainable behaviour. In the "process approach", by contrast, the dilemma is treated as an experience within a learning process, at the heart of which is the recurrent negotiation between competing motivations. This approach fits well with theories on learning and complex problem solving and – judging from our interview data – seems to facilitate reaching creative solutions and less unsustainable behaviours. A better understanding of what influences and what moderates the negotiation process across time and space is needed.

Engaged citizens articulated very detailed and differentiated ideas of the prevailing problems and of possible governance options to address these, which need to be understood to effectively support societal change towards sustainability. Building on their views of current governance arrangements, our interviewees expressed a number of recognisable, distinctive types of ideas on sustainability governance. These types varied with respect to the degrees to which (a) current governance was rejected and (b) grassroots action was seen as essential. They ranged from (i) government-facilitated collective action from the bottom up to (ii) individual action and (iii) a managerial approach. Although systemic change was a hope and ideal expressed by many of our interviewees, this was usually not elaborated in much detail. The different representations had three main similarities. First, representations were built on dissatisfaction with the status quo, and the extent and nature of this dissatisfaction was linked to the governance approach that interviewees saw as a solution. Second, companies – especially where these were seen as non-local or even multi-national – were largely regarded as sustainability antagonists. Third, education was mentioned in all study initiatives, variously portrayed as an engine of essential and profound value change (Galicia, Austria, Italy, Germany), a way to heal a broken society (Romania), or the means to complement, consolidate and broaden out change achieved at the grassroots level (Romania, Germany).

Despite the overwhelmingly strong and almost consensual support for societal change towards sustainability that engaged citizens (in our case members of a sustainability initiative) expressed in the interviews, their behaviours were not necessarily always substantially more sustainable than mainstream lifestyles. For example, while engaged citizens acted pro-environmentally by eating less meat than non-engaged citizens, neither their cost of energy consumption nor the ratio of motorised private transport differed significantly. In analysing the data, it is important to bear in mind the heterogeneity of the different case studies. The initiatives we studied varied in terms of their place of origin across Europe, size, structure, focus of engagement and types of people within the groups. However, as described in Section 2.3, an analysis of the environmental impact of different lifestyle domains paints a more nuanced picture and shows that sustainability initiatives members do have a lower impact for certain areas and lifestyle choices.

2.3 Upscaling sustainability: testing pathways and scenarios for transitions to a sustainable Europe

2.3.1 Designing different pathways to sustainable lifestyles and a green economy: participatory scenario development in seven diverse European regions

The systemic and integrative approach in the Glamurs project included ***participatory visioning of the future*** (Dumitru & García-Mira, 2012; García-Mira *et. al.*, 2012; García-Mira & Dumitru, 2014; García-Mira *et. al.*, 2016; Quist, Thissen &Vergragt, 2011). We developed and applied a method called backcasting scenario development to define a series of sustainable visions of the future showing sustainable lifestyles and a green economy in each region, as well as the pathways to reach those visions. Due to engagement of regional actors and stakeholders which included civil society and bottom-up initiatives representatives, these sustainable future visions are the clear result of co-production of knowledge. Interestingly, visions show a clear distinction between sufficiency-oriented and green growth oriented futures.

Backcasting entails generating one or several desirable future visions before looking backwards and defining a follow-agenda and a pathway towards these desirable futures. Backcasting

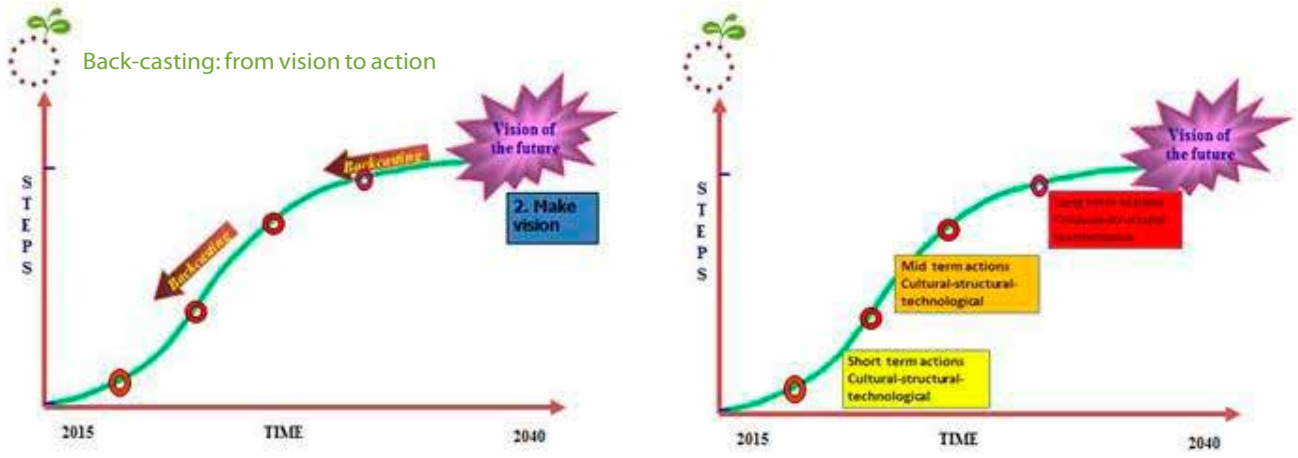


Figure 2. Backcasting: looking back from a desirable future vision (a) and defining short-term, mid-term, and long term changes and actions towards the vision.

has been around since the mid-1970s, initially in the so-called soft energy path studies and since the late 1980s in sustainability studies. Since the early 1990s a shift towards participatory backcasting has occurred and sustainability transitions have become a major focus (Quist and Vergragt 2006, Quist 2016). Over the last decade backcasting has occasionally been applied to sustainable lifestyles, sustainable consumption and local communities, but the economic aspects or the type of economy have hardly been touched upon in backcasting so far (Quist and Leising 2016a).

Based on earlier work and new ideas developed in the Glamurs project a participatory backcasting scenario methodology for sustainable lifestyles and a green economy has been developed, using the distinction between sufficiency or de-growth and green growth as a starting point. The refined backcasting methodology has been applied in the seven European regions chosen in the project.

The backcasting work in the Glamurs project consisted of two parts: the first part includes exploratory backcasting scenario workshops for future sustainable lifestyles; and the second part consists of conducting backcasting pathways and implementation workshops for future integrated sustainable lifestyles for each case study region. All workshops conducted in each of the case study regions involved relevant stakeholders in each region, including bottom-up initiatives, policy makers and government, experts and researchers, civil society, and sometimes also business. On average the workshops had 15-20 participants. The second series of workshops focused on how to diffuse, mainstream and integrate sustainable lifestyles through backcasting analysis, developing transition pathways, policy recommendations and implementation agendas. The main results can be summarized as follows:

- Based on an overview of recent developments in ***participatory backcasting*** for sustainable consumption, sustainable lifestyles and local settings, we developed a participatory backcasting scenario methodology for sustainable lifestyles and a green economy (Quist and Leising 2016a).

- A total of ***14 visions*** and pathways have been generated in the two series of workshops. In the Netherlands and Spain three visions were generated, in Austria partial visions were integrated into one overall vision, while in Germany, Italy, and Romania two visions were developed. Visions have been compared on the dimensions *(1) sufficiency versus green growth, (2) urban versus rural focus*. Despite the considerable economic and cultural differences across the seven regions, three clusters of visions showing considerable similarity could be identified and these include: a cluster of four rural sufficiency visions, a cluster of four urban sufficiency visions and a cluster of four green growth visions, while two visions were considered as miscellaneous and not belonging to a cluster. The clusters are depicted in Figure 3.

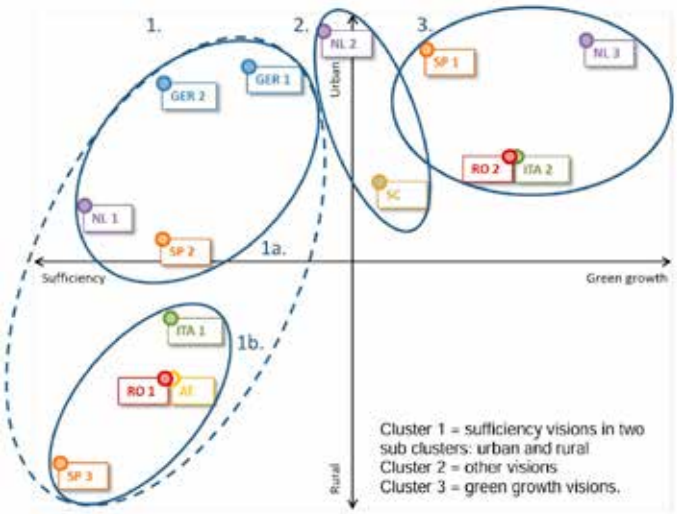


Figure 3. Major clusters of visions according to sufficiency-green growth scale and urban- rural focus

- **Degrowing versus greening the economy.** Considering the different dimensions used to map the diversity of the visions build clusters, most diversity was found in the figure comparing sufficiency versus green growth and urban versus rural. Most

of these visions are based on the dichotomy between sufficiency and green growth, this reflecting different future economic models. Moreover, people foresee the gap between urban and rural areas will be still relevant in 2040 for European societies.

– **Sufficiency visions: the preferred scenario across Europe**. *In total, eight sufficiency visions were developed making it the largest cluster. A further distinction can be identified with regard to a cluster of urban centered sufficiency visions and a cluster of rural focused ones. The second Spanish vision actually is right in between the urban and rural focus, but it will be compared to the urban visions due to some overlapping principles resulting from the pathway comparison. Next to the two sufficiency clusters, a third cluster considers the green growth visions. These four visions are all centered around the urban context (see Figure 3). A final cluster consists of two visions that contain the Scottish vision and the second Dutch vision. These visions are either not clear about their focus on green growth or sufficiency (Scottish vision) or want to combine elements from sufficiency and green growth (second vision from the Netherlands).*

– **Green growth: placing technology at the service of societal problems**. Four out of the fourteen visions are based on the green growth concept , constituting a cluster. The focus on green growth is combined with a preference for communities rather than individualisation. These visions are based on the assumption that inclusive technology will solve current societal and environmental problems. These technologies can also be applied on larger scales. In this way these visions are linked to concepts like circular economy and the sharing economy. The developed green growth visions show a preference for the urban context. That points to an additional way of development that may be attractive to both larger groups of citizens and policy makers in current societies and seems to be an interesting way to explore further.

– **Overcoming individualism**. Across the envisioned pictures on how a sustainable Europe would look like one of the shared features is the community-orientation. Nearly all visions have a community focus and only two visions a focus on individualization. Two clusters of visions can be identified that combine a community orientation with a sufficiency focus and a green growth focus, respectively. A third cluster includes the two individualist visions although they differ considerably in their scoring on the sufficiency- green-growth dimension.

– **The state as guarantor of fundamental rights**. The vast majority of the visions are government –led rather than market-led. The strong role for the government included in the majority of visions acknowledges that market mechanisms still require a strong regulatory framework.

– **Co-producing sustainability: multiple stakeholders and mixed roles.** Nearly all visions involve the emergence of new social actors a more fluid cooperation between civil society, government, research and innovation institutions and firms as preconditions of the diffusion of sustainable lifestyles in 2040. Accordingly, prosumers, new sharing practices & new business models would be important for making Europe more sustainable in the coming decades.

For each lifestyle domain tackled in GLAMURS, a few key elements of future lifestyle pathways have been identified and were included in the subsequent suggestions for pathways towards sustainable lifestyles and green economy at the different scales:

- **Food:** especially local and seasonal food production and consumption.
- **Mobility:** clean and shared transport, less commuting and long-distance travelling due to extended home-office opportunities and enhanced quality of life.
- **Energy:** local renewable energy production and supply systems.
- **Housing:** social innovations like intergenerational co-housing models.
- **Products:** extended lifetime and enhanced reparability, a shift from buying ownership rights to buying services, shared ownership of goods and services within communities.
- **Work life:** integral concepts of work including voluntary or caring work combined with basic income; more flexibility concerning working time and space.

- Based on these three clusters the pathways have been compared on (1) cultural-behavioral changes, (2) technological changes, (3) structural, policy and institutional changes and (4) organizational changes. An example of the results of comparison for the urban sufficiency visions cluster is described below and illustrated in Figure 4.

Selected key elements of pathways along urban sufficiency visions:

- **Cultural-behavioral changes:** recovery of the local languages, stimulation of social entrepreneurship and social shareholdership, sustainability education and integration of sustainability issues in economy and natural science curricula.

- **Technological changes:** short supply chains, local water and energy supply systems, development of technology for smart grids and energy storage, research for sustainable agriculture, support of open science, additional R&D for recycling infrastructure.

- **Structural policy institutional changes:** strengthening local governance, networking and knowledge sharing with civil society actors, alternative indicators of well-being and economic development, eco-social fiscal reform, quotas for emissions and mining.

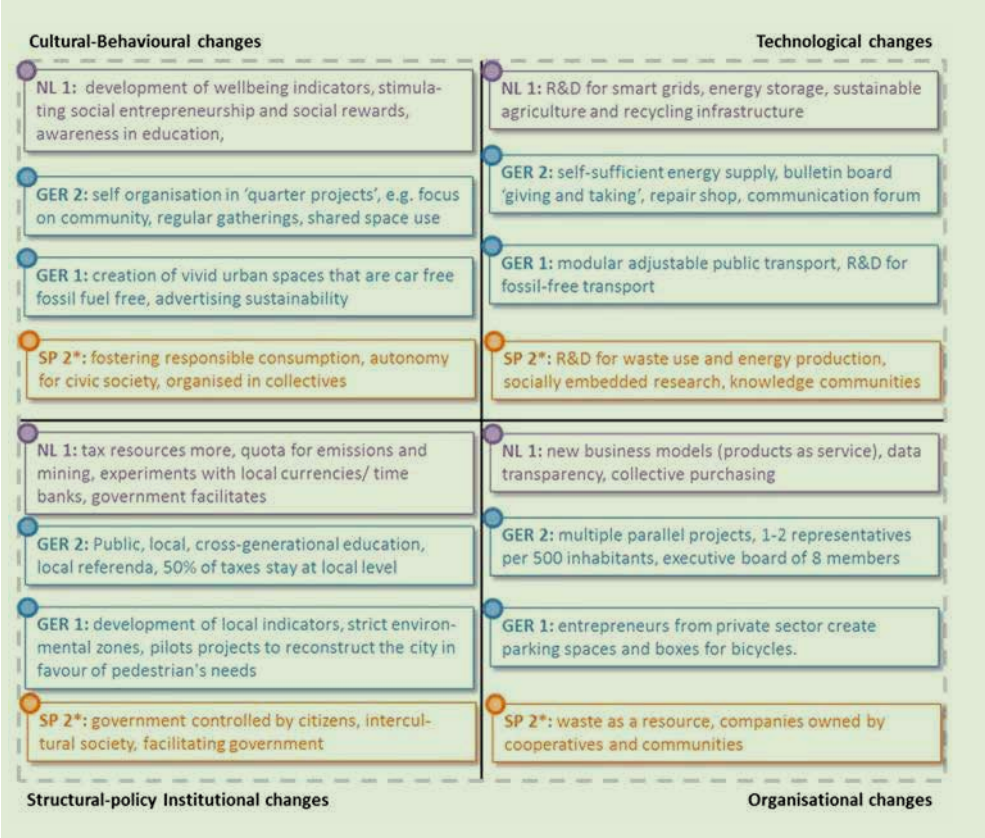


Figure 4. Example: urban sufficiency visions

- **Organizational changes:** fostering sustainable consumption behavior, supporting small business and cooperatives, achieving supply-demand balance, new business models (products as services), data transparency.

Defining the roadmap for future sustainability: main changes and action points.

- **Rural sufficiency visions**: **the driving force behind social learning processes** For the cultural-behavioural changes, these visions show similarities in their focus on learning processes to create sustainable awareness. This is to be achieved via both promotion and education (as pointed out in the Austrian and partly in the Italian results). Another pattern in thecultural-behavioural changes in these visions is the community. Via collectives and social awareness, the community becomes a valued and central part of the society, that will be able to bring about (most of the) changes in the other domains. In these communities, self-organisation is the mechanism that can be found in these visions, that will actually make the changes happen. Among the technological changes, a common element is the focus on technologies for sustainable agriculture and land use control. This is related to the urban nature of these visions and their focus on regional food production. When looking at the structural-policy institutional changes, it is more difficult to find underlying patterns of mechanisms. This also relates to the differences in details of the visions in this domain. In the Romanian and Italian visions, outlines for the changes were developed, whereas the Spanish vision and especially the Austrian pathways developed more details like tax schemes. In the organisational changes finally, a returning element is the equal distribution or the collective management of resources.

- **Urban sufficiency visions**: **capacity building and social mobilization**. The main changes as part of the pathways for the rural sufficiency visions are depicted in Figure.4.

In the cultural-behavioural changes, awareness of sustainability and our impacts on the environment are a common theme (just like in the rural sufficiency visions). This awareness is to be achieved via a focus on the environment and sustainability in education. Moreover, also in these visions autonomy for civic society and self-organisation of communities are the appointed mechanisms to bring about the envisioned changes. In the technological domain, these visions have sustainable energy production, supply and storage as a common theme. This was also to be expected for visions in a sustainable urban context, since this is one of the top priorities for autonomous, sustainable cities that are at the core of these visions. Changes in the structural-policy institutional domain focus on a facilitating role for government in the Netherlands and Spain. Citizens have decisional power and government only facilitates these responsible citizens. Finally in the organisational changes, the first Spanish vision and the third Dutch vision both mention also the power of citizens in big companies and corporations. These firms will have to change towards cooperative owned or led by social shareholders, rooted in local communities, according to the pathways sketched in these visions.

- **Green growth visions**: **clean technology and the democratization of its application**. Among cultural-behavioural changes, also these green growth visions stress the importance of the awareness of the relationship between humans and nature that has to be achieved via continual learning and/or media campaigns. Especially in these growth oriented visions this was pointed out as an important element, to lead this growth into the desired (sustainable) direction. Green growth principles assume investments in clean technology, so technological changes are among the core changes in these visions. The main focus is on advanced recycling and reuse technologies, based on circular economy principles. In the Spanish and Dutch green growth visions democratisation of technology is another shared mechanism. This means that technology is developed more collectively. The fact that technology is presented as a major driver of change also implies that democratisation of technology will contribute to a more democratic change process. In the structural-policy-institutional changes, a common mechanism in the Dutch and Spanish pathways is the focus on citizen initiatives as experiments and change makers. These citizen initiatives serve an important role in the transition to the vision via their niche position where alternative value systems can be developed before they will adopted by society (and especially by government and business). In the organisational changes no significant similarities in underlying change mechanisms can be detected.

- **Concrete action points to materialize visions**: **private self-organization vs public intervention**. different actions ways of guiding the transition are still possible. In the sufficiency visions government in general is ascribed a smaller role, taken over by citizen involvement. Economies are also more based on a local scale, with necessary subsidies and taxes in place to reach this situation. In the urban sufficiency visions, SMEs and entrepreneurs take a major role and fulfil new functions in the society. In the green growth pathways collaboration is an important theme. Via a collaborative consumption and technological development the goals for these visions will be met. Also in this vision, a cultural change (via education for instance) is of importance, together with tax mechanisms and financial incentives for collaboration towards a sustainable society.

Participatory backcasting can be seen as transdisciplinary and interdisciplinary in itself and as good examples of knowledge coproduction (Dumitru et al, 2016). A major methodological novelty in GLAMURS consisted of combining sustainable consumption/sustainable lifestyles and a green economy within the same framework. In back-casting studies, it is usually more common to apply the approach either to a specific domain of provision (e.g. energy, transport, agriculture), or to a specific consumption domain (nutrition, heating, mobility). The novelty in the developed participatory backcasting methodology (building on earlier work, e.g. Quist et al 2011, Quist 2013, Quist 2016) was brought about by the decision to combine sustainable lifestyles with a green economy in a single vision and backcasting methodology, whereas these topics are usually kept separate. In order to realise this integration and to get sufficient diversity in the generated visions in a single workshop, the distinction between, on the one hand, a sufficiency society based on degrowth and moderation of consumption and, on the other hand, a green growth society based on solving sustainability problems via environmental innovation and a circular economy has been used as an input. This has worked very well and as a result in most workshops not only visions depicting sustainable lifestyles in a green growth oriented society were generated, but also visions depicting sustainable lifestyles in a sufficiency-oriented society were developed.

Networks and meetings of very ambitious and critical bottom-up initiatives are separate from more regular stakeholder workshops involving policymakers, experts and business. In GLAMURS, these different stakeholder groups were brought together and worked together on developing more widely shared visions for sustainable lifestyles under different economic contexts, an outcome of in-depth processes of knowledge co-production (see also Deliverable 2.1 for a more detailed account, Dumitru et al 2016).

The development of pathways for sustainable visions provided a series of conclusions regarding the role of policy and governments in supporting their implementation: making visions in dialogue processes can support decision-making processes at different levels and allows for broad participation and citizen engagement; governments could extend regulations, communication and incentives to stimulate initiatives, their lifestyles, and the underlying social norms and principles; governments could decrease/end regulations, communication & incentives that stimulate unsustainable lifestyles, norms and principles at different levels (individuals, groups, regions, societal domains, society at large); governments should initiate public and political debate on economic logic constraining sustainable lifestyles (e.g. socially embedded growth & sufficiency vs green growth).

The visions developed focus on the regional and local scales, and typically ignore the constraints raised by developments at other scales. However, many important developments in technology, energy and governance will unfold at supra-regional level. The next section will focus on the interactions between these different levels.

2.3.2 Testing policy scenarios and their effects on the upscaling of sustainable lifestyle choices and transitions to a green economy

2.3.2.1 *Formalizing psychological processes in micro-economic models of decision-making*

A systematic review of the literature carried out in the project revealed the importance of including specific social psychological concepts and variables within standard micro-economic modelling of sustainable consumption and lifestyle adoption. Modelling entailed widening the scope of microeconomic analysis, and equipping the description of decision-making mechanisms with factors that go beyond consumption and material rewards. The actual behaviour of people is influenced by many factors, which the standard microeconomic theory does not necessarily capture. We have built formal models in the tradition of economics, integrated theories from psychology and derived results and predictions that were checked and refined based on psychological expert insight.

Beyond the understanding of factors influencing sustainable lifestyle choices at an individual level, we were interested in capturing the role of modes of decision-making in everyday life in order to identify opportunities for lifestyle change. Previous research has built a compelling case for the fact that a lot of inertia in human behaviour is related to automatic processes of decision-making, thus questioning assumptions of perfect rationality. The concept of

bounded rationality was developed within cognitive science and decision making studies, to represent the idea that, when making decisions, human rationality is constrained by a variety of factors such as the quantity and quality of information or the amount of time available to take the decision, and by cognitive limitations of the human mind, that lead to the use of judgmental heuristics and cognitive shortcuts. This idea is also included in the so called dual process accounts of human behaviour, which basically assume that human behaviour and choices can be driven by either a reasoned, voluntary, slow, effortful cognition-based system (a 'cold' system), or by an impulsive, unconscious, fast, effortless emotion-based system (a 'hot' system).

In order to understand opportunities for sustainable lifestyle change in everyday life, two theories from psychology were considered in the micro-economic modelling approach of the project: ego-depletion, which addresses the problem of assuming perfect rationality and social norm theory, which allowed us to inquiry into how sustainable lifestyle choices are adopted in groups, thus accounting for the social and shared dimension of lifestyles. Within GLAMURS, we also studied the relationship between lifestyle choices and wellbeing. Previous research had shown that people that adopt "green" behaviours might actually feel good about it. We thus included psychological wellbeing as a benefit people derive from making sustainable choices in micro-economic models.

Social influence theories contend that human behaviour and choices are affected by the presence (actual, imagined or implied) of other people. This influence can take various shapes, ranging from simple forms such as conformism or imitation, to more sophisticated processes such as, persuasion, social norms or minority influence. Social norms are conceived as systems that emerge to guide human behaviour under conditions of uncertainty. Typically, humans can rely on two broad kinds of norms: prescriptive (what ought to be done in a given situation) and descriptive norms (what the majority of other people actually do in a given situation).

Social norms, in particular descriptive social norms, have been considered and described mathematically to extend the utility framework of economic decision-making. People are influenced in their decision by what others do and by the group to which they belong and receive status from. Moreover, people derive psychological well-being from behaving 'green'. We can see these two factors as describing a tension between social and personal norms. Wellbeing is a source of compensation for the self-sacrifice of a reduced material reward from lower consumption. Social norms instead are neutral to green and brown lifestyles: they simply ***convey the majority 'rule' of social influence***.

Our results show that without the self-reinforcing mechanism of descriptive social norms, a micro-economic model of consumption decision with the associated environmental damage would predict an equilibrium level where the two different norms, green and brown, balance each other in a proportion that depends on the environmental awareness of individuals. Descriptive social norms completely change the picture, introducing the possibility of two alternative equilibria, one with a majority of green lifestyles, and one with a majority of brown lifestyles. The model is able to identify and quantify in relative terms the factors that render this scenario more or less likely, such as the intensity of social interactions and the degree of heterogeneity of decision makers. In particular, the model shows the possibly perverse effect of a tax on consumption in the presence of social interactions: with two competing lifestyles and consumers who can switch between them, even though a tax reduces consumption at the individual level, aggregate consumption at the population level may increase. This is an aspect of the ***"behavioural lock-in"*** scenario of the model, ***one where a population is stuck into an undesirable self-reinforcing 'trap' where a majority of consumers adopting a brown lifestyle reinforces itself.***

The psychological well-being factor of the model provides a possible solution of the behavioural lock-in problem. It is described as a factor that provides utility from behaving 'better' than the majority, which means that psychological well-being automatically crowds in consumer motivation for sustainable behaviour, in spite of social influence. The effect diminishes as more consumers adopt the green lifestyle, but this is exactly the desired scenario, where the beneficial role of psychological well-being is less needed.

Once a sufficiently large portion of the population adopts the green lifestyle, ***the self-reinforcing effect of descriptive social norms turns into a 'green' lock-in.*** The reinforcing mechanism of social interactions that keeps society stuck into unsustainable lifestyles is also a mechanism that preserves a sustainable equilibrium.

The model presents a particular feature in terms of the transition patterns towards sustainable lifestyles. If a scenario with two alternative equilibria is realised, factors such as environmental

awareness, demand elasticity, intensity of social interactions and intensity of psychological well-being have a tipping point, a critical value of a particular lifestyle relative share in the population beyond which one or the other behaviour prevails and dominates. In particular, starting from an unsustainable condition with a prevalence of ´brown´/unsustainable lifestyles, the model identifies in mathematical terms the critical mass of green lifestyle adopters that is necessary to reach in order to tip society into a sustainable green equilibrium.

Ego-depletion was also considered in the conceptual set-up of a model of time-use and sustainable lifestyle, where bounded rationality is rendered endogenous through the economic concept of utility 'salience'. The concept of ego-depletion represents the idea a that humans have a limited reservoir of willpower and self-control, so that when this capacity is drained because of ordinary task demands in daily life situations (for example, because of extreme time pressure), a person will have less self-regulation resources available for subsequent tasks.

On a broader scale, interdisciplinary efforts included making a list of the most promising psychology theories and factors that have been understood and translated into economic terms, and have been grouped under a number of themes and objectives:

- *The size inconsistency problem of aggregating individual actions.*
- *Expanding individual utility to include relevant forms of subjective well-being.*
- *Psychological motives that are relevant to societal transitions.*
- *Behaviours dictated by relative rather than absolute values of utility.*
- *Psychological causes of limited rationality.*
- *Time - inconsistency of inter-temporal decision-making.*
- *Individual decision-making is affected by uncertainty of environmental impacts.*

The first five points have been addressed and developed in the micro-economic modelling work during the project (see Section 3.2.1): factors and objectives have been addressed, and have turned into fully-fledged mathematical descriptions of individual and collective behaviours that are relevant to sustainable lifestyle change. The last two themes of the list above represent avenues for future research, and together with extensions of the models developed will contribute to the life of the project after its completion.

2.3.2.2 *Designing the micro-economic models*

In GLAMURS we have developed a number of micro-economic models for describing different aspects of sustainable lifestyles uptake. In particular, we have adopted an evolutionary discrete choice framework that has enabled us to study mathematically and implement numerically individual behaviour embedded in a population of decision makers, in a dynamic fashion.[2]

"Consumption patterns and green lifestyles" is an evolutionary discrete choice model where agents can choose two alternative lifestyles, or norms, in terms of their consumption of an environmentally harmful good. Agents' choice is driven by material consumption, environmental damage, social influence and psychological well-being.

"Being green and going green: multiple equilibria and social tipping points" is a modification of the model above, where agents have heterogeneous preferences regarding two alternative consumption goods, a green good, which is environmentally friendly, and a brown good. We show here that up to three different equilibria are possible, two extreme equilibria where the green or the brown choices dominate, and an intermediate outcome, where the two behaviours are more balanced across the population. In particular, this later scenario is associated with two tipping points, i.e. two critical values of the share of the population purchasing green and brown goods above or below, another equilibria would emerge.

"Multiple identities and multiple discrete choice" is a model that studies, both theoretically and empirically, the interactions between different choice categories that are part of environmentally relevant everyday decisions. In particular, it describes the effect of so-called behavioural spillovers. This model is conceived to be estimated on survey data of household behaviours.

2 For an exhaustive presentation of results we refer to Deliverable 6.1, available at www.glamurs.eu.

The model ***"Evolutionary environmental games"*** considers the collective exploitation of a public good, namely an ecosystem. The characterising feature of this model is the non-linear response of the ecosystem to economic exploitation, with ecological tipping points that define a clean and a polluted regime. In this model, we study how ecological tipping points interfere with social tipping points defined by social influence of collective behaviours.

The different models described so far share a common ground, the evolutionary discrete choice framework where individual decisions occur in a population context, and collective behaviour feeds-back into individual choices in every period. The main variable of the models is the fraction or relative share of agents who adopt a given behaviour - usually the 'green' behaviour. This fraction is a dynamic variable of the model: it changes over time, representing the evolution of lifestyles in the population, and it tells at any time the state of the population, meaning the extent of pro-environmental behaviour adopted by agents.

Individual decisions aggregate at the macro- level, and then contribute to shape a changing decision environment. That means that aggregate decisions feedback into individual decisions, and depending on the nature of the feedback - positive or negative, for instance - we may obtain scenarios where decisions reinforce themselves (positive feedback, leading to the multiple equilibria of a coordination dilemma) or have a negative impact (negative feedback, leading to periodic dynamics).

All models assume two or more alternative behaviours, norms, lifestyles, that are available for agents to adopt, and which have a different impact on the natural environment. Some of these behaviours are more 'green', and some others are less, meaning that they have a larger negative environmental impact. Agents can choose among such different alternatives (discrete choice). Agents' decisions occur in a discrete time dimension, so that choices can be revised every time period (switching behaviour). In particular, this modelling framework is able to describe the occurrence of lifestyles changes, or transitions from a dominant unsustainable lifestyle to a more sustainable lifestyle. Finally, the discrete choice population framework of these models is founded on random utility theory: agents' utility contains a noise term, beside economic and psychological factors, that captures heterogeneity of preferences and also the possibility of 'mistakes' in the evaluation of individual welfare (bounded rationality).

A common feature of the models' outcome is the possibility of alternative scenarios, with a different number of equilibria where the population of decision-makers can converge in terms of their behaviours. If only one equilibrium is possible, there is no uncertainty in terms of long run behaviour: whatever the initial condition of the model is, the population will always converge to a given share of say 'green' and 'brown' choices. But if two alternative equilibria are possible, depending on the initial share of 'green' and 'brown' choices we will have very different long-run outcomes, which are usually characterised by the prevalence of one or the other behaviour/lifestyle. This feature has the following important consequence regarding the uptake of sustainable lifestyles: if there is only one possible equilibrium, whatever policy action that impacts on a parameter of the model is taken, the resulting outcome is a 'smooth' transition, one where the share of 'green' choices continuously increases, and the share of

'brown' choices decreases, accordingly. In a two equilibria scenario instead the change of a parameter produces very little changes in the share of 'green' and 'brown' behaviours in general, but if it gets near to a critical value that separates the two alternative equilibria then a tipping point is reached, where the population shares change abruptly from a prevalence of 'brown', for instance, to a prevalence of 'green' choices.

The different models that we have developed aim at studying the role of a number of psychological factors, beside the traditional incentives of economic decision-making. In our model of green and brown consumption lifestyles with social norms and psychological well-being individual decisions aggregate into total consumption, which depend on the relative shares of green and brown lifestyles. Those shares feed-back into individual decisions through the influence of social norms, psychological well-being and the market. This feed-back effect is based on the psychological concept of descriptive social influence (or similar concepts such as social learning, imitation, conformism), which describes the human tendency of enacting the same behaviours that we observe in significant others in the course of social interaction. Some of the most interesting results are the following:

- Increasing the percentage of people following a green lifestyle is favored by psychological well-being derived from behaving "green". Only if this well-being is large enough we can move to a sustainable lifestyle.
- It is not beneficial for a transition to a green lifestyle if the gap between the environmental awareness of greens and browns increases. What is needed is that this gap actually decreases. This means that the environmental awareness of those people who do not care much about the environment is raised sufficiently. Otherwise, we observe a 'crowding-out-effect'. This is because environmental concern translates into self-inflicted pain from abstained consumption in our model, which, everything equal, favors a brown lifestyle.
- Strong social interaction and/or a high rationality of people favor extreme outcomes with two possible equilibria, a majority of browns or a majority of only greens. The separation between these two equilibria can be viewed as a social tipping point. Small changes of the population following a particular lifestyle or small changes of the underlying fundamentals of our model (i.e. change of preferences) may lead to large jumps. If the population is close to the social tipping point, policy will have dramatic effects or will change nothing if the population is away from the tipping point. In the latter case we talk about lock-in effects.

A typical policy instrument to reduce consumption of a harmful good is a tax on consumption which is faced by all consumers. We show that the working of such a tax is not as straightforward as commonly believed and in fact may lead to undesirable outcomes. The reason is that although the tax lowers individual consumption of the entire population, it reduces the utility from material consumption, in relative terms, more for those following a green lifestyle than for others. This leads to more people switching from green to a brown lifestyle, which overall, could lead to a higher overall consumption. This suggests that taxes must be designed in a more sophisticated way that takes into account social interactions and the resulting interplay of individual decision and collective behaviour, in order to avoid such unintended effects.

2.3.3 **The macro-economic effects of different interventions and policy scenarios** (shifts in patterns of time use, carbon taxes, climate change disaster scenarios...)

A significant task in GLAMURS has been to upscale the results from the micro-economic models to an economy-wide analysis through macroeconomic modelling. This involves moving from a local perspective to a perspective on the total aggregate economy. It also involves taking into account interactions between local and microeconomic developments on the one hand and economy-wide national and transnational trends and development on the other hand. We developed five dynamic macroeconomic models, which allow us to focus on the interaction between individual consumer/household behaviour and firm/industry behaviour, as well as between investment and consumption. The models allow for effects on the aggregate economy in terms of income, wages, and economic growth. They also inform us about the effects of different policies, which we explore in policy scenarios.

To analyse the up-scaling of green lifestyles we combined three main elements. First, we started from ***initiatives*** by consumers who decide to change their behaviour, either triggered

by environmental awareness or by dissatisfaction from a decline in subjective well-being. Second, we analyse these initiatives in the light of macroeconomic and ecological ***trends*** that characterize the macroeconomic environment to which consumers are exposed. For example, consumers face increasing wages and time pressure, increasing prices for certain services and decreasing prices for energy-intensive goods and services, deteriorating environmental quality and increasing threat of climate change. On the one hand these trends might affect the attractiveness of green lifestyles. On the other hand, initiatives towards green lifestyles might be able to affects the trends themselves. Third, we consider ***policies***, both in the traditional form of taxes, subsidies and regulation, and in the more soft form of social interventions. Initiatives and policies might reinforce each other and this interaction may facilitate the upscaling of green lifestyles.

Scaling up of lifestyles has three dimensions in a macroeconomic context, which determine how initiatives and policies towards green lifestyles affect the rest of the economy. First, initiatives have feedback effects on other variables. This is the force behind economic rebound effects and general equilibrium feedback. For example, shifts in consumption patterns change relative prices and wages in the economy. Second, scaling-up has direct effects across different socio-economic groups, with consequences for inequality and other forms of household heterogeneity. We distinguish between different groups and allow some groups to take initiatives, while other groups either consciously follow because of social dynamics, or passively respond to changes in prices and wages. Finally there is a temporal dimension. Initiatives and policies at one point in time need time to affect the economy, through time-consuming adjustments of habits, social norms, production capacities and technologies.

Our suite of five macroeconomic models allowed us ***to focus on the different dimensions of the up-scaling and the different type of policies and initiatives***. Each model was developed to analyse a specific aspect of upscaling of sustainable lifestyles. Some of our models focused on the dynamics of growth and capital accumulation; other models are more static in nature but focus on social norms. ***We deal with policies, analysing existing policies and small policy changes, as well as looking for optimal policy design***. We then put together our insights from the separate models into an extended version of one of the models and used this to run policy scenarios.

We first focused on the interaction between time-use patterns and energy use at the macroeconomic level. We interpret time pressure as the increasing opportunity cost of

leisure. In growing economies, wages increase over time and increase the incentive to work in the market and thus forego leisure and time-consuming household activities. From the macroeconomics and labour economics literature, we know that household members (females in particular) work more hours in response to wage increases, which (partly) explains that leisure and time-consuming household activities have come under pressure and labour participation increased in the growing post-war economy. We point out that this has had serious implications for energy use. First, working more hours increases production and the associated energy input in manufacturing and service industries. A second effect, which has not been analysed thoroughly until GLAMURS, is that spending patterns in the household will shift from time-intensive activities towards energy-intensive activities (cf. Jalas 2002). Our Macro-economic Sustainable Time Use (MaSTU) model first replicated the stylized-facts trends in energy and time use. We then used the model to analyse the effects of both consumer initiatives and policies directed to sustainable lifestyles. The model results suggest that a transition to a sustainable economy with non-increasing household energy use, household waste, and emissions is difficult in an economy with falling energy prices. Lifestyle changes and social norms towards sustainable practices help in the short run, but are overwhelmed by market forces in the long run. ***A policy of energy and waste taxes is needed to complement household level initiatives.***

The role of taxes on energy and carbon in the transition to a sustainable economy is well researched in the economic literature and is subject to a lively debate in policy circles. Traditionally the focus is on the role of industry in reducing carbon emissions and the burden of the carbon tax in terms of competitiveness and jobs. We complement this discussion by looking at the consumption aspects. Our Macroeconomic Tipping Points and Consumption model (MaTiPCo) confirmed that a change towards sustainable lifestyles that is macro-economically effective requires a reduction in total consumption in the economy. Lower consumption levels solve two problems. First, with less consumption production is lower and the demand for carbon-intensive energy and polluting inputs is reduced. A down-scaling of the economy facilitates an up-scaling of sustainable practices. ***Apart from exploiting such a scale effect, we conclude that macroeconomic lifestyle change is facilitated by exploiting a composition effect***. A shift towards sustainability requires a sustained shift from consumption to investment. In particular, lower consumption solves a second problem, namely the problem of how to respond to a threat of climate change. By consuming less, society frees up resources to invest in environmentally friendly technology and production capacity. The threat of climate change and associated adverse effects on productivity of the economy calls for precautionary investment. Hence ***increased investment is needed both to prepare the economy's production capacity for greener production processes and to cushion the effects of sudden disruptive effects of climate change in the future.***

We then further integrated the insights from the microeconomic and cognitive psychology parts of GLAMURS to quantify how habit formation, social norms, identity-driven behaviour, and subjective well-being considerations shape the response of energy use to energy price trends and energy policies. Consumers might derive status or strengthen their identity by conspicuously acting green and buying environmentally friendly goods.

Considering the dynamic macro-economic context, as we do in our Conspicuous Conservation and Climate Change (4C) model, we find that this status-seeking identity-driven consumption behaviour might enhance the transition to more sustainable lifestyles. However, it comes at a cost. Since the households focus on their own individual behaviour, support for economy-wide investments in sustainable production processes might still suffer from free-riding issues and supplementary policies (e.g. through a carbon tax) are useful.

Considering the response of firms to consumers' status-driven demand for green consumption, we analyse how firms position themselves in the market for green products in a separate model. We classify firms in three groups. A first group of firms chooses the high end, serving consumers with strongest desire to act green, the "high-green" firms, while a second type of firms chooses the other end of the "green" market, the "low-green" firms. The third group of firms, labelled "brown", provides the least appealing product to consumers pursuing an identity of acting sustainably. We find that to reduce competition, the lower-green firm sets lower quality than in absence of the network effect, thereby a) escaping tight competition with the high-green firm, b) reducing production costs, and (c) attracting additional consumers who would otherwise purchase brown. We conclude from this analysis of consumer-firm interactions that consumer-driven lifestyle changes might be off-set by responses by firms. ***Policy in the form of minimum environmental quality product standards might reduce the adverse responses by firms.***

Individuals recognise that instead they can increase subjective well-being by caring less about material consumption, being more in touch with nature, and having more time for friends and community activities. However, a lifestyle oriented towards these goals is difficult to realize if society at large is oriented to more hedonic lifestyle and closely connected to an economic system that relies on market labour, mass consumption, energy-intensive production, and global value chains. ***We connect the individual choice dilemma – between eudaimonic and hedonic lifestyle – to a choice that society has at the macroeconomic level***. Formally the analysis amounts to multiple equilibria and lock-in. Intuitively, one can depict the current state of the macroeconomy as an equilibrium in which wages and productivity are high in the formal economy, thanks to effective resource exploitation although at the cost of environmental degradation. As a result, leisure is dominated by market participation. With low environmental quality, little attention to nature in society, and most people, friends and neighbours being busy working hard and spending on material and energy intensive consumption goods, a shift in lifestyle from hedonic to eudaimonic is only attractive if many make the same shift and the total economy is reorganized. It is hard to coordinate such a massive change. Our "Macroeconomic Good Life" model ***formally analyses how the two equilibria emerge and how a coordination failure prevents the transition to the equilibrium that would be preferred.***

We developed scenarios to illustrate the impact of lifestyle change initiatives and policies on energy use, time use, and macroeconomic variables like income, growth and labour participation. Most of our scenarios suggest that lifestyle changes have relatively small effects on energy use. The direct effect is small mainly because energy use by households is small relative to total energy use. Even if the effect is large, it tends to fade over time because energy prices fall and technological progress in energy-intensive sectors increase the demand for energy-intensive consumption goods. ***The effects tend to be bigger if firms adjust their innovation strategy and redirect innovation from energy-intensive to less polluting methods of production and services.*** Also carbon price policies are effective once they revert the trend in energy prices and provide an incentive to redirect innovation. In ***some scenarios we find that lifestyle changes by small groups are reinforced by social dynamics and habit formations: initiatives are followed by other consumers due to peer pressure and once changes take off habit formation may reinforce the shifts.*** It is also found that rebound effects occur. Initial energy savings and lifestyle changes in some domains and by some socio-economic groups tend to be offset by changes in opposite directions in other domains and by other groups. The rebound effects are relatively small and the net effect on energy use is clearly towards a more sustainable economy.

2.3.4 Dynamic interplays between macro-economic dimensions and significant household: insights from agent-based models

Agent-based modeling (ABM) was used to explore the dynamics of lifestyle and economic transformation over time, and as a way to include both micro- and macro-economic factors in decision-making processes and social influence dynamics. It was also used to explore one-time or in-frequent decisions that have a lock-in effect on day-to-day decisions, such as the choice of residence. ABM implies developing a micro-world for the agents to inhabit and interact in and simulate different policy scenarios and their performance. Agent-based modelling work has, in the empirical case, focused on the Scottish case study with two simulation models, one of day-to-day commuting to explore interactions between work/life balance and mobility, and the other operating over a longer term examining life-stage transitions, labour and residential choice. What follows is a summary of results and their policy implications[3]. Figure 5 illustrates the world of an agent-based model:

Figure 5. Representations of households and activities in an agent-based model

2.3.4.1 *Simulating work-life balance and commuting in Aberdeen and surrounding area*

The Time Pressure and Commuting (TiPaC) model was created for the GLAMURS project to explore connections between individual decisions and systemic outcomes. Our initial work with it, now published as Ge and Polhill (2016), considered the combined effects of workplace flexitime arrangements, building a new road, urban concentration, and cycle lanes on commuting time and tailpipe greenhouse gas emissions.

The Scottish case study in Aberdeen and surrounding area is a particularly timely case study for this kind of simulation work because of the construction of the Aberdeen Western Peripheral Route (AWPR), which commenced shortly after the GLAMURS project started in 2014. Partly to relieve congestion in the city, but also partly to provide a development corridor, the AWPR has been the source of some political controversy, especially for those whose living arrangements have been directly affected by the route it takes through the landscape.

Though not the sole basis for its construction, bypasses are a somewhat traditional approach to relieving issues with congestion, which can be significant in Aberdeen during peak hours as people make their way to and from work. Commuting is generally regarded as 'wasted time', as it is neither a domestic / leisure activity, nor is it productive economic work. Efforts to reduce

3 For a detailed description of the models, see Deliverable 6.3 of the GLAMURS project, available at www.glamurs.eu.

commuting time are therefore worthwhile for individual well-being through freeing up time, and for the environment insofar as such efforts contribute to reduction in tailpipe emissions. Building new infrastructure is not the only means by which such aims can be achieved. More efficient use of existing infrastructure can be facilitated if employers are more flexible about when people turn up for work. Insisting that everyone arrives at work at a specific time (e.g. 09:00) has negative effects in two ways. First, and most obviously, everyone needs to use the transport infrastructure in the time leading up to the start of the working day. Second, the insistence on a specific arrival time, and potential sanctions on employees who are late means that people need to make travel arrangements that cater for variability in journey time such that the estimated probability of arriving late is tolerably low (e.g. 0.01 would mean arriving late on average 2-3 times per year; 0.001 arriving late on average once every 3-4 years). The main effect of the latter is to shift the mean arrival time earlier and earlier as the variability increases, which, especially if the employer has a time before which employees may not leave the workplace (e.g. 17:00), has a significant impact on work/life balance. Another approach to reducing commuting time is to increase urban concentration so that, on average, people live closer to where they work.

The main results of the model are summarized in Table 1. The results are interesting in that they show flexitime making the most significant gains in the factors influencing work/life balance, and, though a small reduction in mean CO_2 tailpipe emissions in comparison with increasing urban concentration, larger reductions are achieved in peak CO_2 emissions. With increasing political focus on particulate and NO_x tailpipe emissions in urban areas from diesel engines due to impacts on human health, reductions in peak tailpipe emissions have the potential to reduce the chance of thresholds being breached. Although we did not model the dynamics of particulate and NO_x emissions, it is reasonable to assume their positive correlation with CO_2 emissions. A potential surprise in the results is the increase in commuting time variability derived from increasing urban concentration. A possible explanation is that increasing urban concentration results in increasing congestion, and more unpredictable journey times as a result.

Table 1. Summary of results from the study using TiPaC in Ge and Polhill (2016). Cells are shaded green if they improve the circumstances in the column heading; pink if they make things worse, even if only slightly so.

Socio-environmental infrastructure change	Impact on commuting time distribution	Impact on commuting time variability	Impact on tailpipe emissions
Building a new bypass	Reduces commuting time on average, but by a smaller amount than increasing urban concentration or flexitime. (~2%)	Negligible / small decrease in commuting time variability. (~1%)	Small / negligible increase in CO_2 emissions. (~0.2%)
Increasing urban concentration	Reduces commuting time on average. (~9% for a 4-fold increase in urban concentration)	Increases commuting time variability. (~10% for a 4-fold increase in urban concentration)	Decrease in CO_2 emissions. (~3% for a 4-fold increase in urban concentration; ~35% decrease in peak CO_2 emissions.)
Introducing workplace arrival time flexibility	Reduces commuting time on average, but diminishing reductions for the same increment in flexibility. (~12% from 0 to 2 hours of flexibility)	Decreases commuting time variability. (~85% from 0 to 2 hours of flexibility)	Small / negligible decrease in CO_2 emissions. (~0.4% from 0 to 2 hours.) Large (~80%) reduction in peak CO_2 emissions.

2.3.4.2 *Simulating workplace sharing in Aberdeenshire*

One of the potential studies of interest arising from the backcasting work in the Scottish case study is the possibility of sharing workplaces, allowing employees to work somewhere nearer to home. We have used the TiPaC model as in 3.2.3.1, again looking at commuting time distributions and tailpipe CO_2 emissions, but this time, examining the effect of workplace sharing. Data from the GLAMURS regional survey and the case study survey have been used to populate the model with agents. With Aberdeenshire Council being one of the Scottish case study partners, we have been able to use their workplaces in the region as a basis for the study, exploring the effect of allowing Council employees to choose their normal place of work from any of the Council's locations. In addition, we have implemented simple workplace social networks, allowing us to contrast a situation in which individuals have full autonomy over where they work with one in which they are in small teams, the manager of which has freedom to choose where to work, but the remaining team members must go to the same workplace as the manager. Introducing the workplace hierarchy in the latter case was done based on information from the qualitative interviews of participants in the Council's

WorkSmart programme, that team leaders have an influence on people's participation in the scheme.

To investigate upscaling, we explored two further scenarios of workplace sharing. One scenario allowed Council workers to choose any workplace (even one not owned by the Council) as their normal place of work; the second upscaling scenario allowed all workers (not just Council workers) to choose any workplace. There are therefore four scenarios: no choice (A); Council workers choose any Council workplace (B); Council workers choose any workplace (C); all workers choose any workplace (D). Within each scenario, we examined having a workplace hierarchy and not doing so.

The results have showed that scenarios B and D both lead to improvements in mean commuting times and CO_2 emissions compared with scenario A, but scenario C does not. Introducing a workplace hierarchy results in major reductions in these benefits, to the extent that they can be almost eliminated. The surprise is that scenario C results in no improvement, however, a 'hotspot' analysis of which workplaces increase in occupation shows an increase in demand for locations in the City, and a reduction in demand for locations in towns in the Shire. The Council employs about 10% of the workforce in the area, but has relatively little accommodation in the City, even though many of its staff live there. Allowing Council workers to choose any workplace significantly increases their choice of locations in the City, with the observed net effect. This results in increased congestion in the city, and with 10% of the overall workforce, this is sufficient to eliminate any benefit in emissions or mean commuting time in comparison with the baseline scenario (A). Although scenarios C (especially) and D are unrealistic options, the results reveal the social complexity associated with upscaling.

2.3.4.3 *Simulating life-stage transitions in Aberdeenshire*

The Demographics, Infrastructure and Residential Choice (DIReC) model was developed during the course of the GLAMURS project to explore interactions among households, employers, transport infrastructure, services and where to live. Major life-stage events (getting a new job, getting married, having children, retiring, etc.) are important points at which people make decisions that affect their lifestyles and hence potentially change their habits and consequent environmental impact. Decisions about where to live are influenced by a number of factors relating to the services people need and transport infrastructure they rely on to achieve their day-to-day living objectives. With the right contexts in place (which can be supported through planning and other policy interventions), people can be facilitated to make lifestyle decisions that reduce their impact on the environment.

The DIReC model integrates data from the GLAMURS regional and case study surveys in Scotland[4], housing market data from the Aberdeen Solicitors Property Centre, economic activity data from the Scottish Census 2011, data on industrial sectors and associated demographics from the Office for National Statistics and the Aberdeen City Council 2015 report, and geographically distributed social statistics from the Scottish Index of Multiple Deprivation and Ordnance Survey.

Preliminary results from the model have drawn on the green growth scenario cluster from the backcasting workshops (see Deliverable 5.2). This is particularly relevant in North East Scotland as there has been a decline in the oil industry following the recent collapse in oil prices. Although oil prices are now recovering, the duration of the collapse has been sufficient that numbers of people in the local area lost their jobs. With DIReC, we have simulated three case studies: (i) no collapse in oil prices; (ii) collapse in oil prices; (iii) collapse in oil prices followed by a growth in the renewable energy sector, which particularly for off-shore wind-farms, features many of the same engineering problems as drilling for oil in the North Sea. Our results show that growth in the green economy in North East Scotland leads to near recovery of the state of affairs without an oil collapse over a 2-3 year period. Failure to invest in the green economy, however, leads to a persistent significant decline in economic activity in the area. Figure 6 depicts the results.

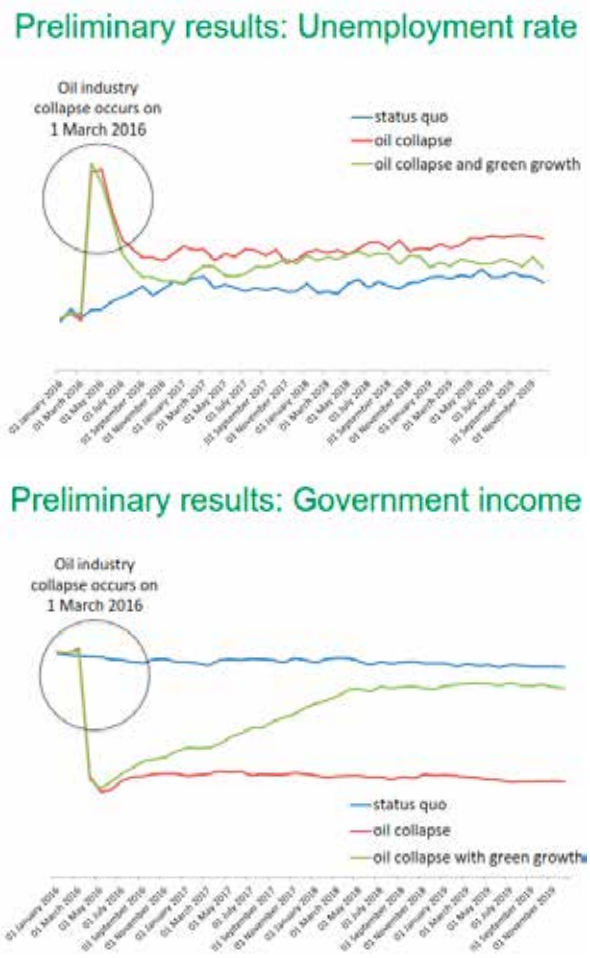


Figure 6. Preliminary results from the DIReC model exploring the green growth backcasting scenario cluster

4 For more information on the survey, check Deliverable 5.9, available at www.glamurs.eu.

2.4 Assessing the environmental impact of lifestyle choices and upscaling the environmental effects of observed and envisaged lifestyles

GLAMURS provides insights into the sustainability of lifestyles **from a multi-dimensional resource and environmental perspective**. Household environmental impacts are evaluated in an integrated modeling framework, starting from a global macro-assessment (inter-country differences) through a subnational assessment with improved spatial detail (inter-regional differences within Europe) to individual- and group-level assessment of environmental impacts. The environmental impact assessment has enabled the analysis of factors influencing consumption patterns and lifestyles and determinants of low-impact living.

Furthermore, the impact mitigation potential of large-scale lifestyle changes is modeled and assessed to provide insights about the potential pathways to future desirable outcomes. Thus, the modeling evaluates which changes in behavior, social norms, technology and alternative economic system arrangements following the implementation of climate, resource efficiency and green economy policies would affect the environmental sustainability of different lifestyles and what are the behavioral domains that hold greatest potential for change in the different regions of Europe.

It is crucial to roll out a comprehensive package of sustainable lifestyle policies and goals that are articulated in a comprehensive framework and planned to intervene at different geographical scopes involving the corresponding stakeholders. Some policies may be applied at a national level and have a uniform effect throughout the country. Nevertheless, other policies may need to zoom in to regard a different context and acknowledge the differences that occur at the sub-national level. Regions, cities, neighborhoods and even smaller social groups have different economic, geographical and infrastructural realities and thus facing different challenges and mitigation potentials.

2.4.1 Global assessment of household environmental impacts

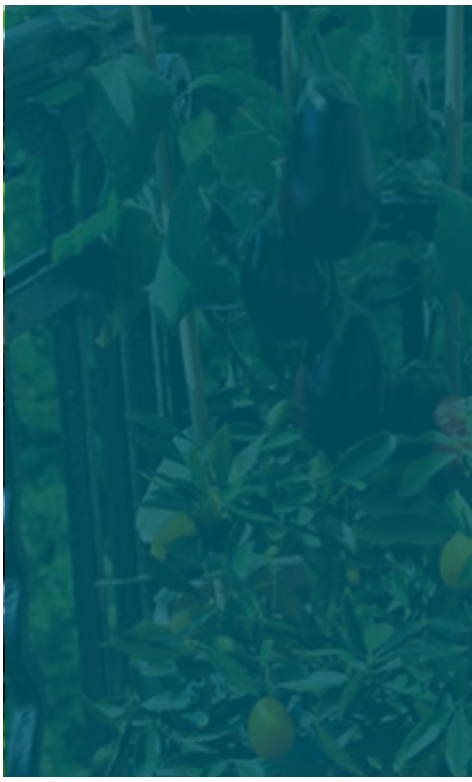
The global assessment of household environmental impacts in terms of greenhouse gas (GHG) emissions and resource use confirms that through their consumption households directly contribute to a significant environmental pressure, specifically more than 60% of

global GHG emissions and between 50 and 80% of total land, material and water use (Ivanova et al. 2015)water, and land-use requirements, as well as greenhouse gas (GHG. In Europe, mobility, manufactured products and shelter are the most emissions intensive categories per unit of consumption (kgCO_2e/EUR) and the three domains together contribute to about 61% of total household emissions. Furthermore, countries vary greatly in their environmental impacts with some European countries contributing to 5 times more emissions per capita than the global average.

In our analysis, we consider global supply chains in their entirety and, therefore, we take into consideration impacts that occur during the whole life cycle of goods: from resource extraction, manufacturing, distribution until final consumption, allocating them to the final consumer. There is a need for an exploration of different geographical levels of intervention to address the different domains and sources of emissions demand for resources, acknowledging the sub-national heterogeneity.

2.4.2 Subnational assessment of household environmental impacts across EU regions

The cross-country analysis was followed by a subnational environmental impact assessment of 177 regions in all EU27 countries (see http://www.environmentalfootprints.org/regional), making a key contribution for the incorporation of consumption-based accounting in local decision making. The subnational heterogeneity degree of household carbon footprints varies widely across countries with high heterogeneity pointing to the implementation of region-level targets, progress measures and consumption-based policies. . Some countries such as Italy, Spain and the United Kingdom show a high variation of average emissions per capita across their regions and this variation is relatively consistent across all consumption categories. This is often related to income inequality across regions since income is a very important determinant of environmental consumption-based impacts associated with clothing, manufactured products and services. Other countries are relatively uniform in terms of the regional impact associated with most consumption domains, but show large differences in the contribution of one particular category. Finland, for example, is relatively uniform in all domains but shelter. Important predictors for shelter differences include geographical factors such as climate and technical factors such as the emission intensity of electricity and space heating sources. A third group of countries such as Denmark seem relatively uniform in terms of all consumption categories.



2.4.3 GLAMURS regional and initiative samples

Through a survey carried out in seven European regions, we explored how different sustainability initiative members compare to their regional counter-parts in terms of GHG emissions from consumption. While the initiatives are very different in nature, we noticed several common trends. In some domains such as food and clothing, initiative members generally had lower emissions relative to the regional respondents. Initiative members had lower consumption of meat and processed food; they were buying fewer clothes, buying more second-hand and repairing their clothes more often. In other domains such as shelter and mobility differences were less obvious suggesting that people have varying degree of agency and lock-in across the different consumption domains. The biggest contributor to transport emissions was flying and our models had limited power to provide solutions for mitigation of flight emissions through behavioral change.

Individual-level bottom-up assessment of environmental impacts embodied in consumption has been produced using the GLAMURS regional and initiative surveys, which enables an analysis of environmental impact differences across different cohorts defined in terms of socio-economic factors (e.g. gender, income), time-use (e.g. working time, volunteering) and lifestyle controls (e.g. vegetarianism). Thus, the analysis of the survey has allowed to trace consistency of environmental behavior across the different consumption domains. For example, vegetarians have been noted to have lower food emissions relative to non-vegetarians, but also lower clothing emissions. Similarly, respondents who don't fly or use walking or biking as means for regular travel have noted lower emissions in other consumption domains as well.

Our analysis reveals domains and behaviors that show potential for bottom-up behavioral change towards sustainability. New social norms and consumption cultures may be encouraged such as transitions towards low CO_2 diets. ***People may experience a higher degree of lock-in (e.g. when it comes to commuting or housing) and a transition may be more dependent on top-down government policies such as taxes on carbon or laws against planned obsolescence in manufactured products.*** There needs to be a dialogue and coordination between the parties to make pro-environmental initiatives successful (e.g. government is responsible for cycling infrastructure but citizens are the ones making actual use of it).

2.4.4 Upscaling scenarios

We further explored the potential of different scenarios for upscaling of sustainable visions and the environmental consequences stemming from a wider adoption of possible future lifestyles, e.g. biking to work, eating vegan, buying organic food, flying less, shopping second-hand clothes, co-owning tools or simply spending less money. We also take into consideration the potential for income rebound effect (in the case of lifestyle changes that lead to money savings), which might undermine or even worsen the outcome of large scale lifestyle changes if savings are spent on emission- or resource- intensive goods.

We further consider the potential for trade-offs across environmental footprints, e.g. some lifestyles changes might lead to a reduction in water impacts but at the cost of increasing carbon. ***Our results suggest that lowering the use of clothing and localizing its production brings benefits in all categories***. Similar is ***the effect of localizing food, switching to organic and seasonal food***. A reduction ***in the use of household chemicals, from detergents to lubricants and plastics, also leads to improvements of all footprints***. ***Biking and walking, implementing flexible work to prevent commute or simply reducing all mobility by half, all offer a significant potential to reduce the carbon footprint.***

3 A knowledge co-production approach to sustainability transitions

Knowledge coproduction envisions knowledge exchange as a process by which knowledge is created through the interactions of stakeholders and scientists (Hage et al. 2010). This view of knowledge creation is akin to the goals of transdisciplinary research in breaking down barriers between scientific disciplines and between researchers and the non-academic community when addressing complex problems (Lawrence and Després 2004).

The subject matter of GLAMURS meant that knowledge coproduction was the most appropriate model. Although highly uncertain, the cost of climate mitigation and adaptation is estimated to be approximately 0.7% of GDP in Europe by 2050 and 1.6% by 2100 (Waisman et al. 2012). Despite these relatively low costs, the reality is that carbon emissions have continued to grow, following trajectories that correspond to worst-case scenarios (Peters et al. 2013). Indeed, over the period 2000-2010, carbon emissions grew at their fastest rate since records began. Members of the public, manufacturers and governments are not, it seems, waiting on the edge of their seats for scientists to tell them how to reduce their carbon emissions. Only by working together can scientists and stakeholders come to know what it is we need to do to transition to sustainable lifestyles and a green economy. GLAMURS has created various opportunities for knowledge coproduction in the project.

GLAMURS adopted a framework for knowledge co-production and integration designed to ensure that input was constantly received from relevant stakeholders and that a realistic and practical focus was always present within research design and implementation. This was done through the organization of stakeholder workshops at both European and regional levels, as well as through the back-casting scenario and pathways development workshops which involved societal actors in designing lifestyle change strategies and alternative business models for a green economy.

A comprehensive project impact overview shows that knowledge coproduction has been one of the most significant predictors of impact in the various social exercises undertaken, which included: workshops with European policy-makers, a case study exchange workshop, back-casting scenario development workshops in each region (described in section 2.1), attendance of sustainability events in each region, regional dissemination events and public seminars, synergy activities with other European projects, and engaging stakeholders through social and other public media.

3.1 Workshops with European policy-makers

The GLAMURS project organized three workshops in Brussels with European stakeholders and policymakers. The first workshop focused on eliciting knowledge from the stakeholders, with a view to providing as much direction to the GLAMURS research. The main impact on the GLAMURS project of the first workshop was realized in the Case Study Exchange, described in more detail later in this section. This came from a point raised in the meeting regarding the important of supporting knowledge networks for sustainability. The second workshop reported on the activities of the project in an integrated way, with the content organized around three themes:

- *Making time for sustainability*. Summary of work in the project investigating the impact of time on engagement with sustainable behaviours, particularly in regional focus groups and work with initiatives.
- *What can local initiatives do for sustainable lifestyle transitions*? Presentation of results from focus groups and interviews with the initiatives, and from the Case Study Exchange.
- *Simulating future human scenarios*. Brought together simulation and modelling work.

Each theme was presented as a single talk with a discussant from the European stakeholder community being asked to give a short response. This proved a successful way of gaining buy-in and meaningful reactions from key stakeholders in the project. Discussants were European Commission members working in different General Directorates: DG Climate Action, DG Research and Development and DG Justice and Consumers. Workshop attendees covered a

range of NGOs (such as Fair Trade Organisation Europe and OXFAM), business representatives (e.g. Academy of Business in Society) and academics (e.g. Fundacion INNAXIS and ESADE Business School).

The final workshop had a mixed approach over two days. Interactive sessions on the first day explored ways forward for research in this area and created space for case study initiative participants to interact with each other and with NGOs, EC officials and other stakeholders in the project. The second day used a more formal approach to present in full the diverse work of the project, in a series of parallel sessions featuring talks from the project research team and also from speakers doing relevant research or involved in relevant initiatives. In both the first and second days, the integrated approach adopted in the GLAMURS research was showcased through presentations that emphasized relevance to stakeholders and opportunity for impact through facilitating discussions.

3.2 Engaging with regional and sustainability initiatives stakeholders

Besides impacts for the scientific community and tangible outputs for non-scientists, there have been a number of wider societal implications of the project's trans-disciplinary work, such as:

- The project has created and facilitated networks of information exchange among the case study initiative participants using social media (Twitter and Facebook), but also through the Case Study Exchange it organized in June 2015. Creating a space for the initiative participants to interact with each other led to a Repair Café being set up in Cluj-Napoca, Romania.
- The backcasting workshops generated a number of actions that were taken on by the initiatives. For example, in the Austrian case study, a core team of fifteen case study participants are planning the implementation of the actions in the backcasting workshop.
- The backcasting workshops also facilitated greater engagement of the research team in activities and consortia not associated directly with GLAMURS. In the Italian case study, the research team have presented their results to the Municipality of Rome, and been invited to participate in workshops of Roma Resiliente, which is part of the 100 Resilient Cities Programme of the Rockefeller Foundation. Similarly, in the Galician case study, members of the UDC research team have been invited to workshops organized separately by one of the attendees at the local GLAMURS workshops.
- Interest in the work of GLAMURS has been stimulated through its activities, and led to follow-on engagement. In the Galician case study, members of the UDC research team have been approached to collaborate on launching a social platform to press governments to prioritize more sustainable lifestyles. Publication of the Scottish case study results in an open access on-line journal (***Journal of Artificial Societies and Social Simulation***, Ge and Polhill 2016) led to interest in sustainable transport research work from another Scottish university. The Scottish team are also planning a meeting with the local councils to highlight GLAMURS research results.

3.2.1 Case study exchange

The case study exchange (CSE) was arranged in response to the first Brussels workshop with European stakeholders. Case study participants from Austria, Spain, Romania, Italy, the Netherlands and Germany were greeted and welcomed to the rooms and lecture halls of the West University of Timisoara. Upon arrival, attendees had the chance to introduce themselves and to appreciate the degree of diversity of the assembled group – not only in terms of the distances people have travelled, but also their ages, occupations, spoken languages and visions of sustainable living.

Overall the event and its results were far beyond our expectations and provided us with a great example (show case) of transdisciplinary knowledge co-production. Moreover, the CSE contributed to the attendees' experience of Europe as a unit, while also strengthening the initiative members' confidence in their daily activities, which was reflected in much of the feedback they provided after the event.

An important part of the case study exchange was the possibility for researchers and case study representatives to engage in a direct conversation about how to work together. Some of the issues raised revealed perceptions of scientists as being too theoretical or the inaccessibility of knowledge due to the complicated language used in scientific publications. Both parties gained clarity on each other's perceptions which encouraged an optimistic outlook on upcoming projects, as well as a fertile context for maintaining dialogue between research and society.

Several issues emerged about the relationship between scientists and the initiative participants, which the meeting was instrumental in breaking down. It is somewhat ironic that the more intuitive, emotional and spiritual ways of knowing of initiative participants are often regarded with caution, if not outright contempt by scientists who are supposed to have more logical, rational ways of knowing. When difficulties in the dialogue with scientists are mentioned, they are somewhat exacerbated by the fact that they publish in specialist journals that are not accessible to the general public – either in terms of the freedom to do so without financial outlay, or in terms of the language used to write the articles. In terms of helping people live more sustainably, articles in academic journals have at best an indirect effect on our everyday lives, and even then over relatively long time horizons.

Upscaling and strengthening sustainable lifestyles and initiatives demands a stronger exchange of information and knowledge throughout Europe between projects, initiatives, science, policy makers and individuals in general. Structures and opportunities of collaboration can foster these dialogues and can make the implementation of suitable policies feasible.

The expected outcomes were experienced as significant by all participants in terms of mutual learning and inspiration between the case studies, as well as between them and researchers in the project. Concrete outcomes such as plans to start repair cafés in Romania are well under way, as well as plans for further networking.

3.2.2 GLAMURS attendance of sustainability events in the region

The GLAMURS project endeavoured to maximize the opportunity to widen its potential impact and relevance. As part of this effort, case study research teams visited events organized by other pro-sustainability initiatives in the same area – that is, initiatives not already studied by GLAMURS. The idea of these visits was to provide a check of whether the

initiatives forming GLAMURS case studies were in any way atypical of grassroots initiatives, and ensure that we weren't missing obvious opportunities for the project to have impact and relevance. It was important that the events visited by GLAMURS team members were not organized by the project itself, again, to create a contrast with data collection exercises, and provide a check that the context of the meetings where GLAMURS had organized them was not itself driving particular outcomes or findings. Researchers therefore attended events of other initiatives with a view to reflecting on their work with the case study initiatives and the project as a whole.

Given that the events organized were not in our control, case study researchers has one year in which to find local events and attend them, reporting back their findings at consortium meetings, for us to discuss. As a speculative task involving reflection, results and impact were by no means guaranteed. Nevertheless, a direct result of this task in the Galician case study was a requested contact with the research team at UDC, who was asked for tools to promote wider environmental awareness and stimulate higher involvement in sustainability initiatives. For the GLAMURS project itself, the exercise emphasized that social networks and attention to the 'business' side are both vital to upscaling initiatives; also, that it is important to provide meeting places for initiatives to engage with mainstream communities, not least in highlighting to the latter that there are more sustainable alternatives to their everyday choices.

3.2.3 Synergies with other European Projects

3.2.3.1 *Seminar on "Sustainable Lifestyles, Social Innovation and Transitions: directions for policy and research, Delft.*

In April, 2016, the GLAMURS project organized a public seminar on "Sustainable Lifestyles, Social Innovation & Transitions: directions for policy & research" at Delft University of Technology (TU Delft) for both researchers and policymakers. The aim was to explore and discuss the links between sustainable lifestyles, social innovation, and new economic models. The seminar focused, on the one hand, on the research implications and policy relevance of sustainability and social innovation initiatives in transitions, and, on the other, on the up-scaling of sustainable lifestyles and social innovations using modeling and visioning approaches. The 7 presentations and the two discussion panels have been recorded and are available on YouTube at https://www.youtube.com/channel/UCtfqcEsoiVJLpsPApAqlhDA.

3.2.3.2 *"Pressure Cooker" workshops*

A) Hosted by ARTS project, DRIFT, Rotterdam

A collaboration between several European projects running at the same time and addressing sustainability transitions from a diversity of perspectives was established between the coordinators of the GLAMURS project (University of A Coruña) and the ARTS project (Dutch Research Institute for Transitions). Two symposia were organized, which adopted a "pressure cooker" methodology involving intense and condensed cross-project exchanges in order to share methods and findings, serve as inspiration, and synthesize findings. The first symposium was organized in Rotterdam with the theme: **"The role of civil society in sustainability transitions"** with the objective to invigorate, support reflection on and co-develop new understandings around pressing topics for sustainability and sustainability transformations. The workshop brought together experts and researchers from four large European projects who discussed common insights regarding the changing roles of civil society and the challenges its actors face in contemporary transitions to sustainability. The outcomes of the workshop were synthesized in a joint article on "Elucidating the changing roles of civil society in urban sustainability transitions", published in the journal ***Current Opinion in Environmental Sustainability***, available here: http://www.sciencedirect.com/science/article/pii/S1877343517300659.

B) Hosted by the GLAMURS Project, University of A Coruña, Spain

The second Pressure Cooker, on **"Theories of change in sustainability transitions"** hosted by the People-Environment Research Group of the University of A Coruña (Spain) and the GLAMURS project, gathered together representatives of nine European projects: GLAMURS, EU-Innovate, ARTS, TESS, PATHWAYS, TRANSIT, BIOMOT, SIMWOOD and MILESECURE, together with other leading experts on the issues of agency and sustainability transitions. All projects address, from a variety of scientific perspectives, the mechanisms through which effective societal transformation towards sustainability can be achieved, and they all tackle the role of individual and collective agency in sustainability transitions. They also have in common the study of a wide range of sustainability and social innovation initiatives and networks across Europe and beyond and focus on their role in complex processes of sustainable change. The rich discussions of the symposium were focused on these topics and proceedings of the workshop are available here***: http://www.people-environment-udc.org/wp-content/uploads/pressure-cooker-2015/II_Pressure_Cooker_Proceedings.pdf.*** A special issue is currently being prepared based on its contents.

4 Policy recommendations: putting science into practice

The integrated approach of GLAMURS facilitated evidence-based insights into the conditions fostering transitions to sustainable lifestyles and a green economy at different scales. Based on interdisciplinary and multi-method approaches to understand these conditions, a series of evidence-based insights can be derived from GLAMURS. These can hopefully inform policy approaches to encourage sustainable lifestyle choices and unlock the potential for alternative economic models.

4.1 Fostering sustainable lifestyle choices

Research on sustainable behavior, as well as interventions aiming to promote it, indicate that being aware of environmental problems and having the right values does not entail making sustainable lifestyle choices. GLAMURS approached the study of sustainable lifestyles with the idea that one first needs to understand how everyday life is organized and how it relates to the experience of wellbeing, in order to identify opportunities for sustainable lifestyle change. Changing habits and routine decisions also requires time for reflection and implementation of changes. The trend towards the acceleration of everyday life (Rosa, 2003) implies unsustainable patterns of "work and spend" cycles (Schor, 1992).

4.1.1

Understanding time-use and promoting time affluence: an entry point for sustainability. Research in GLAMURS has shown that understanding perceptions of time and (in)satisfaction with its use and distribution yields significant promise for sustainability. Also, the experience of time affluence (i.e.: having the time to do what one finds important), and the perception of being in control over one's own organization of time, contribute to higher wellbeing and increase the likelihood that individuals will pursue more sustainable lifestyle choices. How can we then promote the perception of time affluence?

4.1.2

The subjective understanding of time: when both quantity and quality matter: The amount of time dedicated to work and leisure activities, respectively, influences our perceptions of time affluence and our experienced levels of satisfaction and wellbeing. However, it is not only the objective amount of work and non-work time that influences perceptions of time affluence, but also their content and quality. Time-use satisfaction is not only dependent on the type of activity but also on the degree of engagement in said activity.

Taking an integrated approach to sustainable lifestyles that bases sustainability interventions on an understanding of the organization of everyday life and on determinants of both sustainable lifestyle choices and wellbeing could be more effective in fostering change.

Creating the conditions for meaningful choices of work and leisure may support the adoption and diffusion of sustainable lifestyle choices.

Increasing personal control and autonomy over the organization of time, rather than a reduction in the objective quantity of free time, would change more effectively the perception of time-affluence among European citizens.

4.1.3

Searching for work/life balance: identifying the most promising policy interventions. Flexitime options refer to allowing employees choice over the start time of their day. Flexitime options are associated to significant gains in the factors influencing work/life balance, and, though a small reduction in mean CO_2 tailpipe emissions in comparison with increasing urban concentration, larger reductions are achieved in peak CO_2 emissions. With increasing political focus on particulate and NO_x tailpipe emissions in urban areas from diesel engines due to impacts on human health, reductions in peak tailpipe emissions have the potential to reduce the chance of thresholds being breached. Commuting time variability increases when urban concentration does. Increasing urban concentration results in increasing congestion and more unpredictable journey times.

Allowing flexitime options for workers would improve work/ life balance and environmental benefits in a much more cost-efficient, sustainable and effective way than urban concentration measures or building new infrastructure interventions.

4.1.4 Creating opportunities for sustainable activities and community engagement. Dedicating time to establishing and maintaining meaningful social relations is an important source of wellbeing and contributes to perceptions of time affluence. Higher involvement in local communities has the same effects. When inquiring into desired lifestyle changes, from a perspective of time-use, we find that these hold promise and can be harnessed for sustainability, as most include desiring to spend more time in meaningful relations, de-accelerate and reduce consumption.

4.1.5 Pro-environmental identity has a positive influence on sustainable lifestyle choices. Pro-environmental identity refers to a person´s self-definition as one who cares for the environment and is influenced, among other things, by our past sustainability-related behavior. This means that the more we perform behaviors that we perceive as sustainable, the more we strengthen this component of our identity, which in turn leads to more pro-environmental choices.

Taking an integrated and organic approach to sustainable lifestyles that bases sustainability interventions on an understanding on factors also promoting higher wellbeing could be more effective in promoting change.

Fostering higher autonomy in the organization of everyday life and the choice of work and out-of-work activities, could have positive effects for sustainability

Facilitating conditions and opportunities for sustainable and local community engagement can have wide-ranging environmental and social benefits.

4.1.6 The perception of living in a good place: facilitating cooperation & sustainable lifestyle changes. Perceptions of neighborhood quality are important for lifestyle choices that are visible to others and can signal our values. They are likely to stimulate closer community contact and ties, which can stimulate the desire to spend more time and be actively engaged in community activities. Desiring to spend more time in one´s local community can lead to more social engagement and closer community ties thus favoring social cohesion. It can lead to the flourishing of local services and thus local economies. It can support reductions in environmentally-harmful behaviors such as travelling long distances for leisure.

The neighborhood can be the most appropriate level for policy interventions targeting sustainable lifestyle changes.

Government policy can significantly influence neighborhood quality, thus also supporting pro-social behavior, as well as support the creation of opportunities for sustainable activities at neighborhood level.

4.1.7 Strategic targeting of lifestyle domains for the promotion of sustainable lifestyles: Not all activities have the same potential to motivate people to change habits. Activities around sustainable food production and consumption are experienced as health- and wellbeing-enhancing, as promoting closer social ties and as supporting environmental sustainability objectives.

Food-related community activities can thus be an interesting entry point for promoting transitions to sustainable lifestyles. A close second is represented by the domain of mobility, where people consistently outline the various benefits and uses of sustainable and environmentally-responsible transportation options, as a viable alternative to conventional over-reliance on car use.

4.2 The role of sustainability initiatives in the adoption of sustainable lifestyles and transitions to a green economy

4.2.1 Sustainability initiatives: the contagion effect of the greens. Effects of joining sustainable initiatives are generally positive. Their influence also extends beyond members, in promoting sustainable lifestyle choices in their regions through the sustainable options they make available.

European policies supporting the development and expansion of such initiatives, and the creation of local and translocal networks of exchange and collaboration, can contribute significantly to sustainable lifestyle change as well as to the creation of alternative economic circuits.

4.2.2 Joining a sustainability initiative: searching for both social and environmental benefits. Not only pro-environmental motivations but also social and wellbeing motivations are highly relevant when joining an initiative. Members of sustainability initiatives report high levels of satisfaction attributed to their membership experience.

Supporting sustainability initiatives can contribute to addressing both environmental and social problems, associated to climate change and raising social alienation and loss of meaning.

4.2.3 The early riders' yardstick: a tool for addressing local barriers to sustainable lifestyles. Environmental footprints of members of sustainability initiatives are not significantly different from those of regular regional citizens, which might suggest that structural barriers are at work. However, a domain-specific analysis points to significantly lower footprints in domains in which higher personal control over consumption can be exercised and thus provide reasons for hope, suggesting that the choices, principles, values (self-efficacy, autonomy, sense of community, sufficiency) and social norms underlying membership could be much better integrated in all relevant policies.

4.2.4 Furthermore, while regular regional citizens might sometimes use perceptions of barriers as ways to justify inaction, we found members of sustainability initiatives endorse a radical ethic of personal responsibility and reject self-indulgence. Engagement in initiatives also provides opportunities for reflection on the predominant economic logic of our consumerist societies.

Policy interventions can set better conditions for membership of initiatives, for development of initiatives, and remove barriers to sustainable lifestyles.

Considering sustainability pioneers as key informants when looking at the barriers to living a sustainable lifestyle can provide a wealth of contextualized information that can be used by policy-makers in devising appropriate strategies for transitions to sustainable lifestyles.

Enabling broad engagement and facilitating access to opportunities, spaces and resources are essential ingredients in facilitating the development of sustainable initiatives.

4.3 Upscaling sustainability: testing pathways and scenarios for transitions to a sustainable Europe

4.3.1 Upscaling sustainability: trust-building processes. In order to reach the critical mass required for sustainable lifestyles to become mainstream, political disaffection needs to be mitigated and exchange spaces between multiple stakeholders created. While members of sustainability initiatives commonly express a great amount of trust into science, trust regarding the capacity of policy-makers to support sustainable lifestyle transitions is limited, combined with a critical attitude towards top-down approaches to policy-making at local levels.

Letting trust evolve through elaborated transdisciplinary research projects, but also by explicitly re-building trust between local actors, through appreciation of local

efforts and co-creation of an enabling environment, which helps individuals get together and expand sustainability efforts.

The connection of bottom-up initiatives with government programs can support their upscaling.

Intermediary players can help trust develop between sustainability initiative members and policy makers and can mediate between both levels.

4.3.2 Supporting participatory development of future visions. Making visions in dialogue processes can support decision-making at different levels and allows for broad participation and citizen engagement. By elaborating participatory future visions for desired sustainable changes governments could garner enough public support as to extend regulations, communication and incentives to stimulate sustainable initiatives, sustainable lifestyles, and the underlying social norms and principles; at different levels (individuals, groups, regions, societal domains, society at large);

Governments should initiate public and political debate on the economic logic constraining sustainable lifestyles (e.g. socially embedded growth vs green growth) and promote wide stakeholder participation in the development of future visions and pathways for their implementation.

4.3.3 Beyond the majority rule: when behavioural lock-ins benefit sustainability. Choosing a sustainable lifestyle or having an unsustainable one is conditional upon what the rest of society does. This fact explains how "behavioural lock-ins" work. When the majority of citizens behave unsustainably, change towards a more sustainable lifestyle is harder. Those citizens wanting to move to a more sustainable lifestyle are stuck into an undesirable self-reinforcing 'trap' where a majority of consumers adopting a brown lifestyle reinforces itself. However, the intensity of social interactions and the degree of heterogeneity of agents have a key role to play in promoting sustainable lifestyles. Besides, the psychological well-being factor provides a possible solution of the behavioral lock-in problem. It is described as a factor that rewards those behaving 'better' than the majority, which means that psychological well-being automatically crowds in consumer motivation for sustainable behavior, in spite of social influence.

Once a sufficiently large portion of the population adopts the green lifestyle, the self-reinforcing effect of social norms turns into a 'green' lock-in.

Promoting reputation systems rewarding those behaving sustainably may enhance the psychological well-being of sustainability pioneers, contributing to overcome behavioral lock-in problems.

Facilitating engagement of multiple actors in transitions to sustainability and exchange spaces between them may help changes towards sustainability to speed-up.

4.3.4 Transitioning towards sustainability at the aggregate level: inclusion as a must. If environmental awareness of people who do not care much about the environment is not raised sufficiently a 'crowding-out-effect' may happen. This is because environmental concern translates into self-inflicted pain from abstained consumption, which, with all the rest of , favors a brown lifestyle

It is not beneficial for a transition to a green lifestyle if the gap in terms of the degree of environmental awareness between different layers of the population increases. What is needed is that this gap actually decreases.

Governments can support transitions to sustainable lifestyles, by setting the market game rules and ensuring all the agents receive the correct sets of incentives as to increase their willingness to change their lifestyle and gradually commit themselves to this change at a larger scale.

4.3.5 A behavior-informed tax design: complex tools for a complex world. A typical policy instrument to reduce consumption of a harmful good is a tax on

consumption which is faced by all consumers. The working of such a tax is not as straightforward as commonly believed and in fact may lead to undesirable outcomes. The reason is that although the tax lowers individual consumption levels of the entire population, it jeopardizes consumption especially for those following a green lifestyle. This creates an incentive for people to switch from green to a brown lifestyle, which overall, could lead to a higher overall consumption.

There are possibly perverse effects of a tax on consumption in presence of social interactions: with two competing lifestyles and consumers who can switch between them, even though a tax reduces consumption at the individual level, aggregate consumption at the population level may increase.

Taxes must be designed in a way that takes into account social interactions and the resulting interplay of individual decision and collective behaviour, in order to avoid unintended effects.

4.3.6 An ecosystem approach is needed to speed-up transitions: multi-agent, multi-temporal & multilevel perspectives. Lifestyle changes and social norms towards sustainable practices help in the short run, but are overwhelmed by market forces in the long run. Besides, consumer-driven lifestyle changes might be off-set by responses by firms. A change towards sustainable lifestyles that is macro-economically effective requires a reduction in total consumption in the economy. With less consumption, production is lower and the demand for carbon-intensive energy and polluting inputs is reduced. Also, a shift towards sustainability requires a sustained shift from consumption to investment. In particular, lower consumption solves the problem of how to respond to a threat of climate change, which requires precautionary investment. By consuming less, society frees up resources to invest in environmentally friendly technology and production capacity.

A policy of energy and waste taxes is needed to complement household level initiatives

Apart from exploiting scale effects, macroeconomic lifestyle change is facilitated by exploiting a composition effect.

Increased investment is needed both to prepare the economy's production capacity for greener production processes and to cushion the effects of sudden disruptive effects of climate change in the future.

Since households focus on their own individual behaviour, support for economy-wide investments in sustainable production processes might still suffer from free-riding issues and supplementary policies (e.g. through a carbon tax) are useful.

Policy in the form of minimum environmental quality product standards might reduce the adverse responses by firms.

4.3.7 Technological progress, rebound effects and energy prices: the iterative nature of change. Lifestyle changes have relatively small effects on energy use. The direct effect is small mainly because energy use by households is small relative to total energy use. Even if the effect is large, it tends to fade over time because energy prices fall and technological progress in energy-intensive sectors increase the demand for energy-intensive consumption goods. Besides, when starting transitioning to a more sustainable society rebound effects occur. Initial energy savings and lifestyle changes in some domains and by some socio-economic groups tend to be offset by changes in opposite directions in other domains and by other groups. The rebound effects are relatively small and the net effect on energy use is clearly towards a more sustainable economy. Getting married, having a child or retiring are important points at which people make decisions that affect their lifestyles and hence potentially change their habits and consequent environmental impact.

Carbon price policies are effective once they revert the trend in energy prices and provide an incentive to redirect innovation.

The effects tend to be bigger if firms adjust their innovation strategy and redirect innovation from energy-intensive to less polluting methods of production and services.

Lifestyle changes by small groups are reinforced by social dynamics and habit formations: initiatives are followed by other consumers due to peer pressure and once changes take off habit formation may reinforce the shifts.

By targeting major life-stage events for policy interventions may facilitate people to make lifestyle decisions that reduce their impact on the environment.

4.3.8 Priorities for intervention: targeting households and consumption domains. Through their consumption households are responsible for more than 60% of global GHG emissions and between 50 and 80% of total land, material and water use. In Europe, mobility, manufactured products and shelter are the most emissions-intensive categories per unit of consumption (kgCO_2e/EUR) and the three domains together contribute to about 61% of total household emissions.

Giving priority to interventions addressed at reducing household carbon emissions and consumption in terms of mobility, manufactured products and shelter have the biggest potential for reducing GHG emissions in Europe.

4.3.9 Being aware of hetereogenity: incorporating consumption-based accounting in local decision making. Europe is a heterogeneous region and household carbon footprints vary widely across countries. Some countries such as Italy, Spain and the United Kingdom show a high variation of average emissions per capita across their regions and this variation is relatively consistent across all consumption categories. Other countries are relatively uniform in terms of the regional impact associated with most consumption domains, but show large differences in the contribution of one particular category.

Support should be provided for the exploration of different geographical levels of intervention to address the different domains and sources of emissions demand for resources, acknowledging the sub-national heterogeneity.

The implementation of region-level targets, progress measures and consumption-based policies is needed to increase the potential for reduction of carbon emissions in Europe.

The collection and exploitation of local environmental footprint data is mostly needed in order to design policy actions settled to the local reality.

4.3.10 Governing the diffusion of sustainable lifestyles: assessing the direction of change to increase its efficacy. There are domains and behaviors that show potential for bottom-up behavioral change towards sustainability, while in others people may experience a higher degree of lock-in (e.g. when it comes to commuting or housing) and a transition may be more dependent on top-down government policies such as taxes on carbon or laws against planned obsolescence in manufactured products.

Depending on the degree of self-efficacy and lock-in people perceive to attain a certain related-to sustainability goal, transition may be more dependent on top-down government or on bottom-up interventions.

Dialogue and coordination is needed between different stakeholders to make pro-environmental initiatives successful (e.g. government is responsible for cycling infrastructure but citizens are the ones making actual use of it).

4.3.11 Trade-offs between environmental footprints: ranging consumption domains by its associated effects. Lowering the use of clothing and localizing its production brings benefits in all the remaining consumption categories. Similar is the effect of localizing food, switching to organic and seasonal food. A reduction in the use of household chemicals, from detergents to lubricants and plastics, also leads to improvements of all footprints. Biking and walking, implementing flexible work to prevent commute or simply reducing all mobility by half, all offer a significant potential to reduce the carbon footprint.

Interventions aimed at mitigating carbon footprints would be best advised to first consider those consumption domains which if lowered, have associated effects on other consumption categories.

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6 Project identity

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7 Further information

Duration

1-January 2014 – 31-December 2016.

EU Contribution

4.995.836 € (total cost 6.291.315,80 €)

Project website

Project website: www.glamurs.eu

GLAMURS working papers and other publications are available at: www.glamurs.eu

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