

**Green Lifestyles Alternative Models and Up-scaling Regional Sustainability / GLAMURS  
Work Package 3: Development of theoretical conceptualizations and models Deliverable  
3.4: Report on theory integration and refinement**

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**Publication date**

2013

**Document Version**

Final published version

**Citation (APA)**

Quist, J., Adina Dumitru, A., Carrus, G., Panno, A., Krause, K., Zeppini, P., Smulders, S., Stadler, K., & Polzin, C. (2013). *Green Lifestyles Alternative Models and Up-scaling Regional Sustainability / GLAMURS: Work Package 3: Development of theoretical conceptualizations and models Deliverable 3.4: Report on theory integration and refinement.*

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## *Green Lifestyles Alternative Models and Up-scaling Regional Sustainability / GLAMURS*

### *Work Package 3: Development of theoretical conceptualizations and models*

#### *Deliverable 3.4: Report on theory integration and refinement*

*EU FP7 SSH Call: 2013.2.1-1- Obstacles and prospects for  
Sustainable lifestyles and Green Economy, Grant Agreement  
number (613420)*

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*Suggested citation: Dumitru, A., Carrus, G., Panno, A., Krause, k.,  
Zeppini, P., Smulders, S., Stadler, K., Quist, J. and Polzin, C.  
(2016). GLAMURS Deliverable 3.4: Report on theory integration  
and refinement. GLAMURS: EU SSH.2013.2.1-1 Grant agreement  
no. 613420.*



This project is funded with the assistance of the European Union  
under the 7th Framework Programme



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## 1. AIM OF THIS REPORT

The GLAMURS Project has taken up the challenge of identifying the obstacles to and prospects for transitions to sustainable lifestyles and a green economy and has sought to develop 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.

In order to meet this challenge, GLAMURS has:

- 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)
- 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 psychological, social, economic and environmental effects.

As part of its ambitious programme of research, the GLAMURS project set out to work in an inter-disciplinary manner, in order to develop integrated models of lifestyle change as well as models of transition tracks to a green economy, by taking into account the dynamic nature of lifestyle preferences and choices, the conditions under which economic systems are transformed and the governance designs and policy tracks that can steer change in a more sustainable direction.

These models have broadened and deepened existing theories, across different social sciences and thus have advanced understanding of the dynamics of lifestyle and economic changes, as well as of obstacles to and opportunities for change. This has been done by going beyond mainstream psychological, economic, governance, and environmental impact theories separately considered, - where consumer's preferences and citizen's priorities are assumed as relatively given and fixed - to incorporate dynamic theories that explain how lifestyle preferences can take shape and change over time. Conceptual developments have been formalized through integrative models of lifestyles and economic-systemic changes, which have been tested in simulations, using micro-and macro-economic, as well as agent-based modeling. Furthermore, multi-method empirical research has been carried out in the seven European regions included in GLAMURS, in which regional residents have been compared to early adopters of sustainable lifestyle practices in different

domains, and environmental footprints were calculated and compared across the different regions. Finally, a series of participatory future visions and pathways to reach them have been created in each region, which were then assessed in terms of their macro-economic and environmental performance.

Each stage of this integrated programme of research entailed theoretical reconceptualizations as well as inter-disciplinary debates and joint development of the theoretical approaches that could guide an in-depth exploration of the dynamics of:

- adoption of sustainable lifestyles, including individual lifestyle change, spread and upscaling of such choices,
- social and economic tipping points
- participatory envisioning of a diversity of future options that would reflect the cultural and economic differences of European regions, and
- assessments of macro-economic and environmental effects of present and future options.

Theoretical developments have been reflected in the deliverables and milestones of WP3, across the life of the Project. Through Task 3.7, we have endeavoured to refine the theoretical conceptualizations and models developed in the Project, based on the results of the empirical research carried out as well as the simulations and modeling explorations. The report focuses on the theoretical and methodological innovations that have been teased out of the different stages of research, and it describes both disciplinary and interdisciplinary innovations. It also points to the different research needs and open questions that are to be derived from the integrated work of the Project. The report is structured in seven sections that focus on the different areas of theoretical and methodological innovation, with each describing the empirical and simulation work done, the disciplinary and interdisciplinary innovations, and the future research questions and needs. Each section also includes a series of highlights.

## 2. CONCEPTUALIZING SUSTAINABLE LIFESTYLE CHOICES: AN EVIDENCE-BASED FRAMEWORK

### Highlights

- Sustainable lifestyles have been reconceptualised in a comprehensive manner as patterns of time-use/activities that take place in given locations and have associated consumption patterns.
- Lifestyle conceptualization has moved away from an additive perspective and the use of consumption choices as proxies for lifestyle choices.
- Understanding time-use and the meaning and motivations of lifestyle choices and desired changes holds great promise for transitions to sustainability.
- The pursuit of social motivations and autonomy in time organization: key factors in the adoption of sustainable lifestyle
- A comprehensive theoretical framework explaining decision-making processes for environmentally relevant choices has been proposed.
- The pursuit of well-being through eco-friendly and sustainable choices has been provided with theoretical and empirical arguments
- Mindfulness has been analysed as a resource to foster sustainable lifestyles, through citizen's awareness, across society at large
- Significant empirical advances have been made on the relationship between carbon footprint and psychological constructs
- Insights into motivations for engagement in sustainability initiatives have been solidly based on comparative empirics for the first time.

### 2.1 Developing a new conceptualization of sustainable lifestyles

#### 2.1.1 Objectives and work done

During the last decades accumulating scientific evidence has shown that our patterns of intensive resource use together with our 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 ways for steering change in the right direction has become a priority for European citizens and policy-makers in the recent years.

Lifestyles characterized by patterns of intensive consumption are a key challenge for sustainability objectives. However, lifestyles cannot be equated to patterns of consumption, as they are in the first place patterns of activities and behaviours that fulfil needs and hold complex functions of group identification, identity formation and status signalling, the pursuit of happiness and wellbeing, and social communication (Scott 2009, Jackson 2009). As any human activity possesses both a temporal and

a spatial dimension, and most natural systems exist within defined spatial and temporal boundaries (Mee et al. 2015), lifestyles have been conceptualized in GLAMURS as patterns of time-use, that take place in given locations, and have associated consumption patterns (see Del. 3.2, Carrus et al., 2015). Consumption is thus a set of temporal activities, in which consumers utilize or engage with products of industrial systems and through which resource flows pass (Jalas 2005). As affluence increases, time continues to be a limited resource and understanding patterns of time allocation and their relationship to consumption is a key aspect in identifying alternative lifestyle patterns and policy mixes that would contribute to societal transitions to sustainability.

Although affluence has increased, societies in the global North are confronting the manifold challenges of climate change, while being locked in patterns of increased resource consumption which are based on conceptions of wellbeing that posit a materially rich life as a ‘good life’ and have led to unsustainable patterns of “work and spend” cycles (Schor 1992), associated with increased complaints of lack of wellbeing, time pressure, and a lack of meaningful individual and community ways of living. 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 the assumptions underlying current societal and economic arrangements.

However, the rise of a global discourse on sufficiency-based lifestyles, and social movements targeting problems of resource depletion and decreasing wellbeing through an increase in time affluence (or a ‘slowing down’ of ‘work and spend’ and a turning to meaningful activities as a way to organize individual and community time – such as ‘slow food’ or ‘take back the time’), constitute responses to these trends in their attempt to change predominant consumerist lifestyles. Sufficiency-based lifestyle changes, as prominent in the degrowth and voluntary simplicity movements (Kallis 2011), might act as game-changers: they question how current resource-intensive lifestyles are linked to a “good life”. At the same time, many members of western societies do not adopt sufficiency-oriented consumption patterns easily. Various barriers related to quality of life impede this adoption including conventions, feared loss of convenience, or conflicts with common consumerist lifestyles.

Understanding barriers to sustainable lifestyles has required a sharp reconceptualization of lifestyles. Traditionally, research has adopted an additive perspective on lifestyles or has considered sustainable consumption a proxy for sustainable lifestyles, thus leading to research and policy on promoting a reduction in absolute levels of material consumption, or the “greening” of consumption (i.e.: choosing less products and products with a lower environmental impact). While these efficiency-based measures have managed to achieve certain reductions in the overall environmental impact in European societies, they have been limited due to rebound effects and increased material affluence worldwide (Hertwich 2005). Furthermore, efficiency strategies do not change the “game” of consumption, as

they rather tend to reinforce existing patterns of resource use which might be one reason for rebound effects.

Within GLAMURS, we have argued for a new conceptualization of lifestyles that moves away from the additive and consumption-based approach undertaken in much of the previous research, to propose a more organic understanding of the concept for which the dimensions of time and space became highly relevant.

**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 brings them happiness and 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.

This novel conceptualization of lifestyles has been unpacked and put to the test within the project through a switch in focus from specific pro-environmental behaviors in different domains, to the characteristics of work and leisure for different socio-demographic groups and to the study of the role of time in the organization of everyday life. The project analyzed how characteristics of working arrangements influence wellbeing and pro-environmental behavior, how desired lifestyle changes might involve a re-structuring of work and leisure in order for the adoption of sustainable lifestyles to be possible, how the availability of time might influence sustainable lifestyle options and how an evaluation of neighborhoods might influence a desire to spend more time locally – and thus reduce unsustainable mobility, for example.

Beyond adopting a time-use perspective on lifestyles, we have also investigated how a sustainable lifestyle might be conceptualized by people in different regions, and what its characteristics might be. We have done this by investigating what people desire as changes in terms of patterns of time-use in their everyday lives, as well as by studying the motivations and impact of being a member of a sustainability initiative. The project has studied and **compared across seven European regions and six lifestyle domains that are relevant for sustainability:** the work-leisure balance, housing, food consumption, mobility, energy use, and the consumption of manufactured products. It did so through a combination of qualitative methodologies such as focus groups and in-depth interviews, and quantitative ones such as survey questionnaires for both regional residents and those that are members or founders of sustainability initiatives.

Our results show that people feel increasingly pressured by the juggling of multiple roles and that a sense of control over the organization of work and leisure leads to the experience of time affluence (having time to do what one finds important). The results also show that whether we decide to use time on sustainable activities depends on our values and identity and on the social norms that are prevalent in each context. We also find that if people experience time affluence and they evaluate the neighborhood they live in to be of high quality, they feel happier (they experience greater wellbeing). That their desires for change provide hope for sustainability (e.g. we find there is a prevalent desire to spend time doing things in one's community, or spending more time outdoors). And that the adoption of sustainable lifestyles is influenced by what we call social motivations, or motivations for meaningful connectedness with others, as well as environmental and health motivations.

### **2.1.2 Key disciplinary innovations (*Environmental Psychology*)**

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The concept of lifestyles originated in the domain of health research. The focus of this research was on changing specific features and behaviors that might pose a threat to physical or mental health, so as to promote change from specific unhealthy lifestyles to healthier ones (Schwarzer 2011, cf. Carrus et al. 2014). In conceptual terms, this “additive” perspective on lifestyles, if applied to the concept of sustainable lifestyles, would imply that in each area of life or domain of behavior, the more a person acts sustainably, the more sustainable his/her lifestyle would become. In terms of research methodology, this conceptualization leads to a scientific method by which specific sustainable behaviors are identified, their specific determinants are analyzed, and specific interventions are designed that target those determinants.

Although studies exploring the effectiveness of these types of interventions have shown a certain amount of success (e.g.: Abrahamse et al. 2007), the general conclusion in the literature is that effects tend to be limited in time, they are more successful in the case of low-impact behaviors than high-impact ones (Steg et al. 2014) and the required transformation at wider societal levels has not yet been produced. An additive perspective on lifestyles, although providing interesting insights into the determinants of specific behaviors and lifestyle choices, has not proven to be successful in highlighting the conditions for a sufficiently fast-paced transition to sustainable lifestyles in contemporary affluent societies.

GLAMURS started from the recognition that a certain level of consumption is a constant in human life, and a medium for reaching certain goals and performing any sort of activities. However, it endorsed an approach to the relationship between lifestyles and material (includes resources, materials and energy) consumption in which consumption is considered the “infrastructure” through which certain activities

are performed, in order to reach certain goals. 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 (thus it is used, at the same time, to satisfy individual needs; indicate, establish and negotiate our position in a social group; and organize our social life in culturally meaningful ways).

One of the important disciplinary innovations for Environmental Psychology brought about by GLAMURS is that such a conceptualization implies a move away from discrete consumption behaviors or even specific environmentally-relevant activities, and towards the division of time-use in everyday life. Choices regarding time-use and the reasons behind them become the focus of inquiry. Only by undertaking a broader inquiry into why people do what they do, for what goals and with what motives, we can understand why things have come to be as they are, and why change seems so complicated (e.g.: why we have started to define ourselves and our lifestyles as consumerist and why evidence does not steer us away from certain practices). Also, focusing on people's choices of activities and time use has brought about the possibility to look at their motivations, the level of lock-in related to participating in accepted social practices and better understand the motives which drive action in certain unsustainable directions. 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 a space for societal reflection on issues of lifestyles and wellbeing.

Secondly, it shifted attention from specific motivation for action to people's subjective experience of time, which can be either a driver or a barrier to sustainable lifestyles. Time-use is not only an objective category; it is also a subjective experience. People organize their activities and tasks in different ways; experience acceleration, time squeezing and time pressure, or, on the contrary, time affluence, and these experiences lead to feelings of stress and unhappiness/lack of wellbeing, which in turn lead to specific adjustments and behavioral trade-offs (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.) as well as to potentially experience consumption as more than a way to fulfill needs or ensure a good life, but rather as an end in itself (the reasons behind this and the different psychological functions of consumption need further exploration). Both subjective assessments of wellbeing as well as behavioral adjustments have important consequences for material consumption levels and environmental impact. Survey results show, for example, that desired lifestyle changes involve spending more time in meaningful connection with others, in community, and outdoors, as well as the pursuit of time affluence. These results have important implications for sustainability, as we have argued elsewhere (see Del. 4.2, Dumitru et al., 2016; and Del 5.3 to 5.9, Case study Reports).

Thirdly, objective and subjective experiences of time-use have influence on the ways in which activities are chosen- whether they are taken in reflective/deliberate ways or habitual/automatic, a fact which has implications on efforts to change unsustainable patterns of behavior. Beyond normal cognitive limitations, we know from previous research that under time pressure people would fall back on automatic decision-making which makes changing behavior more problematic (Verplanken and Wood 2006). Also, any effort to change either specific behaviors or an entire lifestyle requires time to reflect and evaluate options and get informed about alternatives. Our results support the fact that understanding patterns of time-use has important implications for designing policy that would promote the adoption and spread of sustainable lifestyle choices. The approach of the study of lifestyles from this more organic perspective is novel in the field of Environmental Psychology.

## **2.2 Models of decision-making: interdisciplinary understandings of determinants of sustainable lifestyle choices**

### **2.2.1 Objectives and work done**

To understand how different disciplines such as psychology, economy and political science address and investigate research questions related to environmentally relevant behaviour (ERB), we have carried out a systematic review of the literature, which shed light on differences and similarities across all of these research areas. This review points out that an increasing number of meta-analyses appeared about this topic in the last decade or so on (about 22 meta-analyses have been carried out which, in different ways and with different meta-analytical approaches, investigate these issues). Specifically, the most part of psychology studies focuses on an individual level investigation of the relationship between ERB and its antecedents. For example, these studies investigate the relationship between attitudes or emotions (e.g., guilt) and environmentally friendly behaviour or intentions. By contrast, empirical studies in economics often rely on determinants such as income and geographical location or, for example, price elasticity of demand for certain environmentally friendly goods or services. One of the key insights from our integrated review is that, in order to understand trajectories towards sustainability, what matters most are both the long-run effects that result from behavioural change as well as the complex interactions that arise between different types of behaviours and the spatial and temporal contexts where these occur.

As we described in more detail elsewhere (see Glamurs D3.2), we put forward in GLAMURS the idea of lifestyles as patterns of time-use, that take place in given locations, and have associated consumption and production activities and behaviours that fulfil a variety of human needs and hold psychological and social functions, such as self-definition and social interaction, group membership and status signalling, for the pursuit of individual development, happiness and wellbeing.

To elaborate a theoretical conceptualization driving the development of empirical models we have also carried out a comprehensive review of a series of theoretical psychological accounts that can be used to understand human ERB. In this review, we firstly explored how a dual-process account of social cognition and behaviour can deepen our understanding of the mechanisms underlying ERB. For example, we reviewed studies that shed light on how people can take an unsustainable option when the so called “hot” system (e.g., unconscious, rapid, automatic, and with low cognitive costs), overrides the “cold” system (e.g., conscious, slow, deliberative, and with high cognitive costs; see Keren & Schul, 2009 for more details) in making environmentally relevant decisions. In this view, the dual-process account was considered as an overarching umbrella framework where other psychological theories can be placed. For example, starting from the strength-model of self control and ego depletion theory (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998) we postulated that ego-depleted individuals should be characterized by a greater sensitivity to urges and impulses arising from the hot system and, in turn, be more likely to go for an (un)sustainable option when making decisions. In line with the aims of the project, we pointed out some factors which make the transition to a sustainable lifestyle across larger strata of the population harder. Starting from this point, we considered the psychological concept of mindfulness (drawn from clinical and health psychology) and we further reviewed a number of studies which pointed out that a means to replenish individuals’ depleted resources can be a mindful and present-centered mindset. Thus, our work highlighted mindfulness as a key factor which can foster the transition towards a sustainable lifestyle, so that mindful individuals could be more likely to enjoy the benefits of positive psychological experiences as they occur in the present, without necessarily seeking life satisfaction through materialistic rewards and consumption of material goods.

### **2.2.2 Key disciplinary innovations (Environmental Psychology)**

Based on a literature search and systematic review, we have sought to re-organize and advance knowledge about the adoption of a sustainable lifestyle and how it may be spread across society at large. In particular, the integration of different theories, coming from different fields, within a comprehensive theoretical framework allowed us to shed light on decision-making processes related to environmentally-relevant choices. More specifically, the main disciplinary innovations can be summarized in the following points:

Advancing knowledge on how the interplay between time scarcity and the pursuit of materialistic , typical features of the consumption-based lifestyles of current western societies, lead to barriers in the adoption of sustainable lifestyles;

Proposing a conceptually-sound understanding of individual decision-making processes as they apply to both in-frequent and frequent, environmentally-relevant everyday decisions, as a necessary stage for the micro-economic modelling of

decision-making, and of the adoption/spread of certain choices through social influence mechanisms.

Identifying mindfulness as a means to pursue subjective well-being through a more sustainable lifestyle:

As mentioned in the previous section, the traditional approaches to lifestyles in health studies assumed a linear relation between the number of “healthy” behaviours and individual actual health. Later on, such a linear “additive” model has been translated to the domain of sustainable lifestyles and environmentally significant behaviour, by many studies conducted in the field of environmental psychology, which applied wide known social psychological models of rational choice (e.g., Ajzen, 1991), or psychological constructs such as values, beliefs and norms (e.g., Stern et al., 1999) to predict discrete environmentally relevant choices such as waste separation, recycling, energy and water saving, transportation modes, green consumerism, etc.

These approaches to lifestyles have been criticized for neglecting extra-individual aspects involved in the formation of environmentally relevant daily life choices. For instance, Barr, Shaw & Coles (2011) suggested how embracing a broader notion of “social practice”, rather than focusing on single isolated behaviours, would allow a more accurate account of the space-based dimension of pro-environmental practices and sustainable lifestyles. Thus, we have argued on the importance of also considering the multiple spatial aspects involved in the formation of sustainable lifestyles, by extending the focus beyond the home range (for example, considering the issue of work-leisure balance in daily life routines), or the possibility of positive and negative spillovers in the transfer of sustainable or unsustainable practices from the home to the workplace. These ideas led us to the conclusion that integrating phenomena such as behavioural spillovers (e.g. Thøgersen and Ölander, 2003) due to, for example, rebound effects (e.g. Sorrell et al., 2009) and cognitive biases (e.g. Sherrill, 2008) should play a central role for understanding both the difficulties and chances related to achieving sustainable lifestyles in present day societies. Starting from these arguments, we developed a preliminary definition of sustainable lifestyle as a pattern of collective daily pro-environmental practices that are affected by individual characteristics, contextual factors and societal processes, as well as by the interactions between these three aspects. These issues were discussed with more detail in a specific part of a GLAMURS Deliverable (D3.2.).

A substantial advancement in the field of Social and Environmental Psychology has also been made through the elaboration of a comprehensive theoretical framework that provides relevant insights about the decision-making processes involved in environmentally relevant choices. This theoretical model includes features coming from three relevant mainstreaming theories and approaches: i) the strength model of self-control (i.e., ego depletion) postulating that humans have a limited reservoir of cognitive resources and when such a reservoir is going down then higher-order

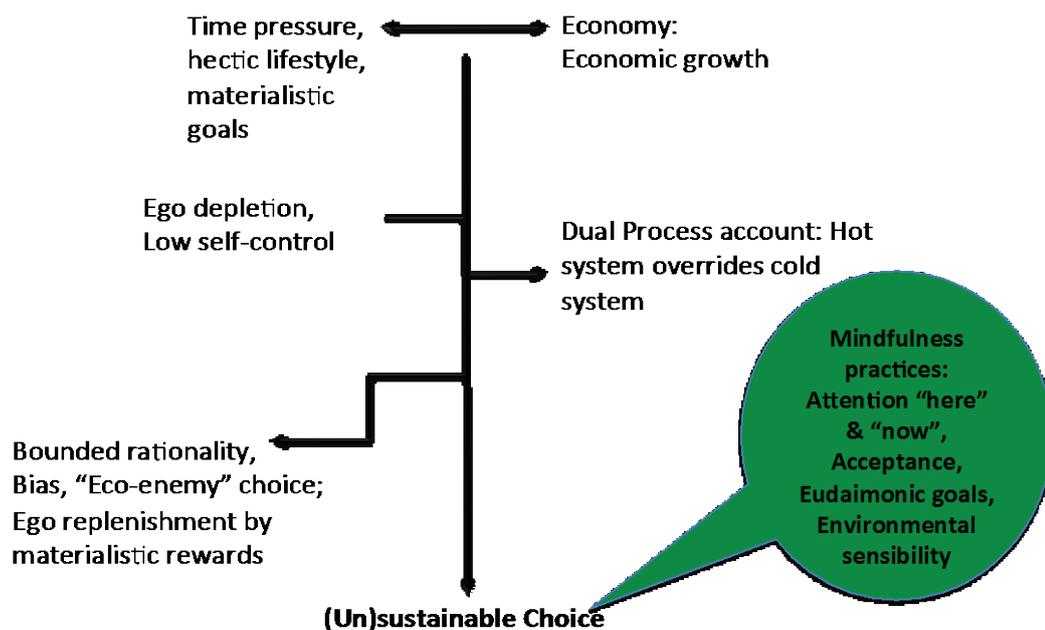
cognitions may be affected; ii) Dual processes accounts, representing an umbrella framework that includes theories referring to two mind working systems that people adopt when facing with decisions and activities, which in turn, give rise to specific behavioural patterns. iii) The mindfulness approach as a mean to reduce the cognitive load triggering a state of ego-depletion, and in turn, as an antecedent for the adoption of sustainable lifestyles that seek the pursuit of individual well-being through more sustainable rewards other than mere material consumption (for instance, contact with nature or other nature-based solutions).

Pursuing of well-being through materialistic rewards gives in fact rise to elements such as time pressure, a hectic lifestyle and hedonic treadmill effects (i.e., people soon become accustomed to a given level of material welfare and in turn seek greater material welfare). These are all factors that also trigger a state of ego-depletion. We then outline a process that sees such factors either as significant barriers hindering the adoption of sustainable lifestyle or as elements affecting psychological well-being.

We have referred to the strength model of self-control (i.e., ego depletion) to figure out what happens when people are faced with environmentally-relevant decisions under conditions of time pressure or high cognitive load (i.e., conditions depleting individuals' cognitive resources, and in turn, affect higher-order cognitions such as decision-making and reasoning, and which frequently occur in the present-day European urbanized society). These circumstances, which trigger a state of ego depletion, can determine the switching from a cold system of reasoning that is based on logical rules, cognitive efforts and analytic and reflective thinking to a hot system of reasoning, that instead, is based on impulsivity, urges, default processes and thinking shortcuts that determine conditions of bounded rationality and judgment biases, thus giving rise to potential (un)sustainable behaviours. In addition, based on this account, an array of activities carried out under conditions of ego depletion could make people more likely to engage in high environmental impact behaviours, because some of these behaviours are thought to be restorative (e.g., compulsive shopping, overeating, car driving and so on); thus, giving rise to a vicious circle where a hectic lifestyle to pursue materialistic rewards triggers a state of depletion which may lead to (un)sustainable behavioural patterns, due to them being based on poor rational decisions; and accordingly, the adoption of (un)sustainable habits (e.g., compulsive shopping, overeating) is used to restore such a depletion state.

We have thus proposed a mindfulness approach to interrupt this vicious circle as it represents a means to reduce the cognitive load triggering a state of ego depletion, and in turn, fosters the adoption of a sustainable lifestyles that pursues subjective well-being through more sustainable rewards and not only material consumption (e.g., cultivating personal spirit, positive experiences rising from helping others and spending more time for common and public goods, restoring psychological wellbeing through contact with nature and outdoor experience, walking). Contact with nature in particular also increases awareness about the relevance of human behaviours for

global environmental change. Specifically, we think that mindfulness can foster a sustainable lifestyle through two paths. First, some studies pointed out that mindfulness can lead to greater well-being by disregarding material rewards and, consequently, supporting ecological behaviours. For example, people can engage in environmentally-friendly activities to replenish their resources rather than through material rewards. Second, other studies showed that mindfulness could lead to greater well-being through empathy and connectedness with nature, which are already known to be two relevant predictors of pro-environmental behaviours (Howell et al., 2011). Thus, we point out that mindfulness practice could be a relevant key factor to foster transition towards a more sustainable lifestyle across European communities. The integration of these theoretical approaches into a comprehensive conceptual framework represents one of the main disciplinary innovations of the GLAMURS project. These issues are graphically summarized in Figure 1.



Carrus G. & Panno A. (2016). Presentation at the final GLAMURS Conference. Bruxelles.

**Figure 1:** A dual process account of (un)sustainable lifestyles

## 2.3 Understanding determinants of sustainable lifestyle options

### 2.3.1 Objectives and work done

The main objective of this part of the work has been to investigate sustainable lifestyle initiatives in seven regions across Europe. In general, the research focuses on understanding the determinants of adoption and evolution of sustainable lifestyles and the resulting alternative consumption-production-systems, obstacles and prospects for alternative ideas leaving their niches and spreading, the changes in lifestyles and the effects of these changes on levels of well-being and carbon footprints.

The first aim of this report is to find out more about drivers and motives that effect people to become engaged in the mentioned initiatives. Secondly, we investigated, whether this dedication of sustainability initiative members influences their level of well-being. Thirdly, we inquired into whether sustainability initiative members differ from the other, not engaged regional inhabitants and if they report more environmental friendly behaviours.

One specific focus was to reach a better understanding of how and why sustainability initiatives emerge and what main drivers exist for initiative members to participate in those. Being active in a sustainability initiative can be understood as an environmental behaviour, or in the terms of Stern (2000), be defined as environmental activism. Environmental activism as a sub-form of environmental behaviour is determined by the same predictors as behaviour in other specific behavioural domains (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). The influence of selected psychological determinants showing a significant influence on environmental behaviour was already tested in preceding studies (with a focus on: values (Poortinga, Steg, & Vlek, 2004; Stern, 2000; Stern, Dietz, Abel, et al., 1999); norms (De Groot & Steg, 2010); self-efficacy (Tabernero & Hernández, 2011); or environmental identity (van der Werff, Steg, & Keizer, 2013)). Taking the individual foci of the different initiatives into account, we added determinants, accordingly. For example, technological innovation attitude would be relevant for initiatives like Repair Cafés or those initiatives which are otherwise dedicated to repairing activities.

We found that several psychological constructs have a significant influence in determining whether one person is a member of a sustainability initiative or not. The probability to be a member of an initiative increases if one has high levels of self-efficacy and a strong environmental identity. Especially environmental identity was found to have a very strong impact on the probability to be a member. On the other hand, people with a high technological innovation attitude were less likely to be active in an initiative. The same was found for people with high conservation and self-enhancement values. Other determinants, such as social and personal norms

and other values (benevolence, universalism and stimulation), were found to have no significant effect, neither as a potential nor a barrier for becoming a member of a sustainability initiative. Although certain psychological determinants of environmental activism (in its different forms) have been investigated before, this is, to our knowledge, the first study investigating such a diversity of initiatives in so many European regions and the psychological differences between members and non-members.

A second theoretical starting point focused on well-being. Its relevance is intensely discussed within current research on sustainable lifestyles. For one, the adoption of a sustainable lifestyle is widely connected with the perception of declined well-being in the advanced economies of the Western world (Black & Cherrier, 2010; Brown & Kasser, 2005; Tim Kasser, 2009). Also, the current prevalent lifestyles characterized by high consumption and consumerism do not seem to deliver on the promise of bringing increased well-being (Dumitru et al., 2014). However, previous studies showed that levels of subjective well-being and environmental behaviour are linked (Brown & Kasser, 2005). Besides, current lifestyles based on materialistic values seem to have a negative effect on the level of subjective satisfaction, not to mention the environment (Dumitru et al., 2014).

Our survey results showed that none of the scales that were used to assess well-being (subjective satisfaction of life, health-related well-being and present aspiration) were able to uncover any meaningful difference between members of sustainability initiatives and non-members. Even when controlling for age, gender and income, the differences remained insignificant. Qualitative data obtained in the in-depth interviews carried out with members of sustainability initiatives point to a few potential explanations for this result: members report that their volunteer activities sometimes lead to a certain level of exhaustion, as high participation tends to be the characteristic of just a few of the overall members (even the volunteer behaviour of responding to our survey reflected this reality, as in some initiatives, nominal membership is much higher than actually participating members); volunteer activities also cut out into their leisure time, which is sometimes frustrating, even though all members report that the satisfaction derived from volunteering for meaningful causes compensates for such frustrations; and finally, the struggles for ensuring a sufficient level of income when making a more radical change in one's personal lifestyle (e.g. such as living in an ecovillage) or ensuring sufficient funding and human resources for the activities of the initiatives might also contribute to the lack of differences in wellbeing.

As the third focus of our study, we expected people who engage in a sustainability initiative to show less environmental harmful behaviours, respectively show more environmental friendly behaviour (Dumitru et al., 2014). With regards to the lifestyle domain of food on one hand, members of sustainability initiatives reported more environmentally friendly behaviour than participants who are not members of an initiative. So, they acted environmentally friendly by eating less meat on average. On

the other hand, neither for the cost of energy consumption nor for the ratio of motorised private transport a difference did appear between members and non-members of an initiative.

### **2.3.2 Key disciplinary innovations (Environmental Psychology)**

One main advance in the discipline of Environmental Psychology was the possibility to connect carbon footprint research with psychological determinants. We got the chance to relate the impact of several environmentally significant behaviours to psychological traits that are prevalent in both – members of sustainable initiatives and not-engaged people living in European regions. For the lifestyle domain of food consumption, we were able to relate membership in such an initiative to less meat consumption and thus less harmful behaviour towards the environment, for example.

In terms of volunteer engagement in sustainable initiatives, we found social motives to play an important role. This is a key result that enables us to define more precise future research questions. For instance, we recognized the relevance to focus on social needs and constructs when studying such early adopters more in detail. It will be interesting to focus on the relationship between different categories of motivations, such as connectedness and environmental protection, for example, when it comes to volunteer engagement.

## **2.4 Interdisciplinary innovations: theoretical and methodological developments**

As a first step of an interdisciplinary theoretical and methodological innovation in GLAMURS we considered the psychological models that are more easily permeable also from different disciplines such as economics and political science (e.g., social influence, bounded rationality, dual-process accounts, prospect theory), because this approach made inter-disciplinary collaboration more promising. These theoretical models reviewed offered a well-grounded framework by which other GLAMURS partners from different disciplines (for example micro-economists, macro-economists) could explore the formation, dynamics, and spread/larger adoption of sustainable lifestyles. As mentioned before, a reconceptualization of lifestyles as patterns of time-use and the conceptual articulation of psychological dimensions influencing processes of individual decision-making, as well as of the role of social influence mechanisms on the spread of sustainable lifestyle choices have been actively employed in the micro-economic modelling of the adoption of sustainable lifestyle choices. The dynamic exploration of the interaction of psychological characteristics, social feedback through the formation and signalling of social norms and the pursuit of utility understood not only as material rewards but also as social rewards or the pursuit of a state of wellbeing, has led to highly novel results about

the different equilibria that can be reached in society and the influence and weight of policy at different moments in the transitions to sustainable lifestyles (more about this part of the work is described in the next section of this report; Del 6.1, by Zeppini & Finus (2016), also provides detailed information on the micro-economic models). These interesting results would not have been possible without intensive inter-disciplinary collaboration between psychology and economics.

Beyond the adoption and spread of sustainable lifestyles at micro and meso-levels, we were interested in the investigation of macro-economic effects of larger and more structural changes if sustainable lifestyles are to be upscaled and trigger significant demand shifts and market and policy adaptations. More specifically, following our conceptualization of sustainable lifestyles as patterns of time-use, with associated consumption patterns, the work of our macro-economist team at the University of Tilburg added another piece to the puzzle, showing that changes in the demand-side are very important, but not sufficient. Even if sustainable lifestyles spread from the bottom-up, through grassroots initiatives and innovations, technological change needs to also be steered in a sustainable direction, as the increase in wages and the decrease in the price of energy would otherwise keep incentivizing intensive consumption in the long run.

The development of a regional survey, followed by a survey targeting members of sustainability initiatives, provided a unique opportunity for methodological interdisciplinary innovations. Items capturing lifestyle choices in the six domains of GLAMURS were developed by psychologists and industrial ecologists in ways that could be useful for both measuring self-reported behaviour and choices as well as calculating environmental footprints. Beyond the methodological challenge and novelty of this approach, an interesting interdisciplinary advance was related to the possibility of incorporating lifestyle and behavioural indicators in the analysis of environmental footprint determinants, and also pointing to the behavioural potential for change in different lifestyle domains, based on the flexibility and elasticity of components of footprints (see D3.2, Carrus et al., 2015; for the complete theoretical justification; Del 4.2, Dumitru et al., 2016, for the lengthy description of the regional survey; and Del. 7.2, Vita et al., 2016a, for a detailed account of environmental footprinting results in the different regions and how survey data has been used).

In discussions with the industrial ecology team, psychologists developed a series of survey items that served a two-fold purpose: both measuring self-reported behaviour and the carbon footprint of individual choices. These collaborative efforts involved both interdisciplinary conceptual discussions and understandings as well as methodological solutions that had to be found to serve the two purposes. By taking the industrial ecologists' perspective into consideration, we were able to design survey items in a way that they capture behaviour relevant to carbon footprint calculations while avoiding hindsight bias as well as allowing for usable reply options at the same time. One important lesson we derived from this collaboration refers to the need for further exploration of methodologies that can serve this dual goal.

Information needed for the calculation of environmental footprints is sometimes not easily retrieved in self-reports, due to characteristics of memory processes and the necessity to register information over longer periods of time. Methods such as diaries, as well as developments into app-based and on-the-go data collection methods using ubiquitous technological means need to be further explored for this purpose.

Another key innovation was provided by the inter-disciplinary work entailed by the development of an ontology, a sophisticated tool that was designed to follow, map and monitor the process of knowledge co-production (see Del. 2.2, Salt et al., 2016, for detailed information on ontology development in GLAMURS). Explicit work on terminology and connections of concepts across disciplines has supported researchers in broadening their disciplinary horizon, the field of Environmental Psychology included.

## **2.5 Future research and open questions**

The GLAMURS project has started to explore the role of a conceptualization of lifestyles as patterns of time-use in the understanding of barriers to and drivers of sustainable lifestyle adoption and spread. It has advanced understanding on how this approach might be applied to a more organic understanding of lifestyles and might open up research questions on the role of personal goals, aspirations and desires for lifestyle change in the transition to sustainable lifestyles. Starting from how people organize their time in different regions, what they consider as time affluence and what they want to change has significant implications for sustainability. Research should further explore, in more detail and using creative methodologies, the relationship between patterns of time-use and sustainable lifestyle options; the possibilities infrequent decisions open for change in lifestyles; the connections between social motivations to dedicate more time to important relations and sustainability; the relationship between time-use, wellbeing, and sustainable lifestyle choices. Further experimental research should also be pursued on the role of subjective perceptions of time (affluence/scarcity; perceptions of control over the organization of time) on sustainable lifestyle changes.

Future research should test the connections postulated in the GLAMURS conceptualization of decision-making through lab experiments and field studies. For example, experimental paradigms that analyse the influence of the level of cognitive resources (e.g.: depletion state vs. control) should be adopted to shed light on the mechanisms underlying environmentally-relevant decisional processes. Some key factors could play a potential mediating role in this relationship. For example, personality dispositions (e.g.: coping strategies, empathy, and honesty) may counteract the effect of depletion on sustainable choices; or the other way around, intrapersonal psychological conflicts might undermine the adoption of sustainable lifestyle choices even among highly-motivated individuals (see for example

Glamurs Deliverable 3.3 for a discussion on the interplay between intrapersonal conflicts and governance models). In a similar vein, situational factors such as time affluence, or tailoring of information aimed to provide a frame fitting with sustainable choices could interact in the relationship between ego depletion and sustainable choices. Longitudinal and diary studies should thus explore habits that individuals use to restore their cognitive resources, and in turn, provide guidelines to elaborate mindfulness-based interventions aimed to promote a change in such habits. In fact, mindfulness can be easily affected by contextual features (e.g., Brown, 2011; Davidson & Kaszniak, 2015). Brief mindfulness trainings have been developed and tested on a variety of outcomes. For example a brief mindfulness meditation session of less than 20 minutes can improve creativity (Baas et al. 2014, Colzato et al. 2012). Thus, future research should test whether brief mindfulness training (e.g., Baas et al., 2014) could also be helpful in fostering pro-environmental behaviour as well as awareness about global climate change.

In this direction, Lim and colleagues (2015) showed that a brief mindfulness meditation training self-administered via web applications and smart technologies was effective in determining more compassionate behaviour towards strangers. Thus, such a brief mindfulness training – which is accessible to a large audience – could be adopted with the purpose of coping with climate and ecological issues. Lim et al. (2015) even tested the scalability of such brief training and obtained important results with less than three hours training administered during a period of 14 days. Thus, in order to improve mindfulness skills, it might not be necessarily required to attend a time-consuming meditation class. This is encouraging in terms of applicability of these findings. Last, but not least, mindfulness-based programs are starting to gain popularity also as useful interventions in schools, targeting both teachers and pupils, to promote human health and well-being (e.g., Gold, Smith, Hopper, Herne, Tansey & Hulland, 2010). In a similar vein, we think that mindfulness aspects could be fruitfully incorporated within environmental education programs (particularly those involving outdoor nature experiences, where short mindfulness training could act in synergy with nature appreciation and conservation concepts, to foster a non-dominant and a more sustainable view of human-nature relations). Clearly, future research is needed in this direction.

The main challenge for future research on sustainable initiatives will be associated with integrating larger initiatives or possibly even networks of sustainable endeavours. Collecting data from larger samples should allow for more in-depth analysis, which was limited in this project due to the small number of initiative participants. In terms of content it could be fruitful to focus on social aspects of climate change challenges that may be reflected in motivations for volunteer engagement. To further elaborate the interconnectedness of the role of individuals in a shared world should be one main focus to enable engaged citizens to ask policy makers to bring about the changes they need.

Research should be pursued further, also, to find ways to support those engaged citizens and spread their ideas across whole regions. We find it plausible to focus not only on collective lifestyles, but on each individual's role in the great transformation towards a sustainable future. Research should strengthen each person's endeavours to consume less, be well and still allow a future for the next generations to come.

As already mentioned before, methodological developments in the measurement of individual and household behaviour, as well as the association between patterns of time-use/activities and consumption associated to them, in different settings, should be further explored. On-the-go, app-, and GIS-based measurements, the use of household observational methods that are as non-invasive as possible, diary-based and other creative means of registering both behaviour and consumption baskets should be explored.

### 3. DETERMINANTS AND SPREAD/ADOPTION OF SUSTAINABLE LIFESTYLE CHOICES: MICRO-ECONOMIC FACTORS INFLUENCING SUSTAINABLE LIFESTYLE CHOICES

#### Highlights

- Micro-economic decision-making models were extended with psychological dimensions.
- Mathematical modelling of descriptive social norms and psychological wellbeing was done.
- The interplay of individual decisions and aggregate behaviours was explored.
- Multiple equilibria in long-run behavioural dynamics were explored, separated by social tipping points.
- We also found different sensitivity of lifestyles change to policy parameters depending on the intensity of social influence and the variability of preferences across the population.

#### 3.1 Objectives and work done

The study of lifestyles and lifestyle choice required to widen the scope of microeconomic analysis, and to include in the description of decision making mechanisms factors that go beyond consumption and material rewards. Psychologists provided us – the micro-economic modellers - with many interesting ideas, concepts, and theories, which, intuitively, made a lot of sense and have considerable empirical research supporting them. The actual behaviour of people is guided by many features, which the standard microeconomic theory does not capture. The challenge was to fully understand these concepts and to formalise them in our models. We have built formal models in the tradition of economics, integrated theories from psychology, derived results and predictions and asked for feedback from psychologists, which they always happily provided.

Psychology theories and factors 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 wellbeing.
- 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 about environmental impacts.

The first five points have been addressed and developed in the economic modelling work during the project: factors and objectives have been addressed, and have

turned into fully-fledged mathematical descriptions of individual and collective behaviours relevant to sustainable lifestyles and to lifestyle change. Milestone 24 (Inventory of theories, models and results from WP3) is an exhaustive presentation of the various psychology theories, and psychology factors that were considered relevant and promising for building psychologically informed micro-economic models. 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.

Following here we list and describe the micro-economic models of sustainable lifestyles and lifestyle change which have been developed. For a more detailed description we refer to Milestone 12 (Integrative models formalised).

- 1) “Consumption patterns and green lifestyles”: this is an evolutionary discrete choice model, where agents can choose two alternative lifestyles, or norms, in terms of their consumption of a unique, environmentally harmful good. Agents’ choice is driven by material consumption, environmental damage, social influence and psychological wellbeing.
- 2) “Being green and going green: multiple equilibria and social tipping points”: here agents have heterogeneous preferences regarding two alternative consumption goods, a green good, which is environmentally friendly, and a brown good.
- 3) “Multiple identities and multiple discrete choice” is a model that studies, theoretically and empirically, the interactions between different choice categories that inhabit environmentally relevant everyday-life decisions. In particular, it describes the effect of so-called behavioural spillovers.
- 4) The model “Evolutionary environmental games” considers the collective exploitation of a public good, namely a lake. 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 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 with 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 together, 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). The models are (discrete) time dimension, so that agents can revise their choice every time period (switching behaviour). In particular, this modelling framework is prone 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: 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).

### **3.2 Key disciplinary innovations (Microeconomics)**

In our model of green and brown consumption lifestyles with social norms and psychological well-being we describe the individual decision-making process embedded in population dynamics. 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 feedback 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 behaviors that we observe in significant others in the course of social interaction. Consequently, the main feature of our model is the interaction between the individual and collective dimension of consumption choices.

Some of the most interesting results are the following:

Increasing the percentage of people following a green lifestyle is favoured by psychological well-being derived from behaving "green". Only if this well-being is large enough can we move to a sustainable lifestyle.

If the gap between the environmental awareness of greens and browns increases, this is not beneficial for transitions to green lifestyles. This gap needs to actually decrease. 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 not-consuming, or abstaining from consumption in our model, which, everything equal, favours an unsustainable, or "brown" as we called it, lifestyle.

Strong social interaction and/or a high rationality of people favour extreme outcomes with two possible equilibria, a majority of green or a majority of browns. 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, in order to avoid such unintended effects.

### **3.3 Interdisciplinary innovations: theoretical and methodological developments**

The knowledge interchange between us and the psychologists in the project resulted in an extremely fruitful collaboration from which we benefit a lot and which will form a building block of a new research stream at the Department of Economics, University of Bath, on behavioural sciences and economics, which we will call “psychonomics” in order to stress the very integrative research approach, different from the additive approaches we have seen in the past, often called behavioural economics.

In particular, two classes of theories from psychology were considered in our micro-economic approach: social norms and ego-depletion. Within the duration of the project we have mainly focused on the first theory, social norms, while ego-depletion is presently being considered for writing down a model of time use where bounded rationality is endogenised through the economic concept of utility ‘salience’.

Social norms, in particular descriptive social norms, extend the utility framework of economic decision-making. People are influenced in their decision by what others do and to which group they belong and derive status from. Moreover, people derive psychological wellbeing from behaving green. We can see these two factors as describing a tension between social and personal norms. The latter 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. Because of that, descriptive social norms are at the same time the lock-in factor that keeps society stuck into many un-sustainable lifestyles, but can also be the mechanism that maintains the same society into a sustainable equilibrium, once green lifestyles get adopted by a sufficient share of the population. Factors such as environmental awareness,

demand elasticity, and psychological wellbeing allow to regulate the separation between these two alternative equilibria that is the tipping point in the share of the sustainable lifestyle in the population beyond which green behaviours are self-reinforcing.

### 3.4 Future research and open questions

Ego-depletion is a psychological theory that describes the limited reservoir of mental power for decision making, and goes beyond utility theory by modelling bounded rationality (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Depending on their current status of their reservoir, people may decide very differently. Within the Glamurs project, Ego-depletion has been proposed by the psychologists in the Department of Education at the Roma Tre University to explain how people switch between the two different states of a dual process account of social behavior, for which we can here use the terms of “hot” and “cold” mental states (e.g., Keren & Schul, 2009). In fact, in the least 30 years, social cognitive research has extensively elaborated on what has been called as dual-processes theories and automaticity of human social cognition (e.g., Bargh & Chartrand, 1999; Fazio & Towles-Schwen 1999; Kahneman, 2002; Strack & Deutsch, 2004). The idea behind these theories is that there are two different modes of processing social information and the resulting social behavior, which describe a basic idea of human bounded rationality (e.g., Kahneman, 2002), and suggest a distinction between processes that are unconscious, rapid, automatic, and with low cognitive costs (i.e., hot), and those that are conscious, slow, deliberative, and with high cognitive costs (i.e., cold). Specific situational factors (for example time pressure) can make the hot system prevailing over the cold system, and resulting in impulsive and un-sustainable choices. Self-control and its negative counterpart, namely ego-depletion, are thus crucial to link dual process accounts to sustainable everyday choices. People in their everyday lives exert the capacity to regulate the self to overcome the impulses resulting from the hot system. This ability to attain deliberative control over impulses is extremely adaptive and is needed to delay gratifications of immediate desires and engage in behaviours pursuing long-term desirable outcomes, such as for example, living a more sustainable life. When self-regulation resources are depleted, individual could then more likely engage in un-sustainable behaviors and make less sustainable choices, independently of their environmental awareness, personal norms, and motivations. Deliverable 3.2 reports a more detailed description of these aspects. More empirical and modelling work is needed to include the phenomenon of ego-depletion into economic models of decision-making and spread of sustainable lifestyles.

Future research should also tackle the effects of different types of policy options on the spread and evolution of the adoption of sustainable lifestyles; the relationship between individual identity and the different (un)sustainable lifestyle choices; and the relationship between different forms of utility and contextual elements triggering

the activation of one form over another (e.g. material utility versus the activation of wellbeing motives/or intrinsic aspirations). Also, future research and modelling should look into the effects of identity changes over time, as individuals adopt sustainable lifestyle options in certain areas of life and observe the social and wellbeing effect of their choices. Identity formation processes can also explain the persistence of certain minority fractions of the population in making sustainable choices, and counter-weight the effects of less consumption utility.

## 4. TIPPING POINTS IN TRANSITIONS TO SUSTAINABLE LIFESTYLES AND A GREEN ECONOMY: EXPLORING DYNAMICS OF LIFESTYLE AND ECONOMIC CHANGE

### Highlights

- *Four macroeconomic growth models were developed to analyse the between interaction lifestyle changes and aggregate income, prices, and emissions.*
- *The models suggest that the main macroeconomic driver towards a sustainable lifestyle is the technical potential towards green innovation and the social benefits from the combination of reduced working time and improved environmental quality.*
- *The analysis suggests that the main macroeconomic barrier towards sustainable lifestyles is the trend of declining energy prices.*
- *Without a big push, coordination failures are not likely to be solved and social dynamics are a barrier to change rather than a stimulus.*

### 4.1 Objectives and work done

The aim of the macroeconomic modelling is – in line with Task 6.4 in GLAMURS – to use tools from growth theory and ecological economics to aggregate effects on micro and meso level to the macro-economic level, for studying interactions and for a focus on the dynamics of lifestyle and economic change. By aggregation, we mean that we aggregate up the separate effects on household and national levels to an economy-wide (and international) level. By interaction, we mean ‘feedback’ effects, i.e. links with other developments and threats like climate change damages, income gaps, etc.; special attention has been paid to the feedback effect from consumers to producers in the form of technical change and innovation. Finally, the dynamics of developments over time are stressed as opposed to static one-time effects. This task has involved the development of small stylised models to analyse opportunities, illustrate directions and identify policy levers. It involved the following subtasks: (i) selecting mechanisms from Task 6.1 that can be most fruitfully studied in a macroeconomic context and develop the macro-economic policy model (ii) selecting initiatives from Task 6.2 that can be most fruitfully studied in a macroeconomic context and formulate the policies to be studied, (iii) calibrating the models using the quantitative information from WP3-5, (iv) running the models to evaluate policies including those elicited from the WP2 stakeholder workshops and meetings.

We have developed four macroeconomic models that put the concept of lifestyles as developed in the GLAMURS project in a macroeconomic perspective.

The first model (“The Macroeconomic Sustainable Time Use Model” or MASTU-Model) focuses on lifestyles as patterns of time-use in everyday life that have associated consumption patterns to them (see Section 2). We have translated this into a model in which households choose how much time they work for the market and how much time they devote at home and in the (local/social) community. We use the concept of “household production” according to which households can only enjoy certain activities when they combine their time with energy and other inputs. Households feel time pressure in the sense that the opportunity cost of time spent at home increases steadily over time if market wages grow. Moreover, if energy becomes relatively cheap over time (with its price growing less fast than wages), time pressure translates into increased household energy use. The underlying cause for wage growth and energy price reductions are macroeconomic growth and technical change.

The second model (“Macroeconomic Tipping Points and Consumption model”, MaTiPCo) extends the standard Ramsey-Cass-Koopmans dynamic macroeconomic model (cf. Acemoglu 2009) with a hazard rate for the possible occurrence of a tipping point or a regime shift in the climate system. At the tipping point, a sudden shift occurs to a lower total factor productivity in the economy due to, for example, changes in the precipitation patterns, flooding and desertification. The model shows that the possibility of tipping makes it, first, to reduce consumption and save more in order to prepare for the possible shock and, second, to tax emissions at a higher rate to reduce the probability of the shock occurring.

The third model (“Conspicuous Conservation and Carbon Concentration” or 4C model) introduces “conspicuous conservation” in a standard model of economic growth. Conspicuous conservation describes the phenomenon of status driven environmentalism, where individuals undertake publicly visible pro-environmental activities for the purpose of gaining social esteem. It fits the category of identity-driven pro-environmental behaviour for which empirical support has been reported in WP4. The macroeconomic implications of conspicuous conservation is that individuals are prepared to take pre-environmental action even though they feel that they cannot significantly influence environmental quality, or, to use a psychological concept, when their self-efficacy is low. This behaviour helps achieving the transition to a sustainable economy, but is not the first-best way to do this. Depending on the macroeconomic conditions, households may take too much or too little pro-environmental action. The inefficiency stems from the fact that status drives behaviour rather than actual environmental degradation. Environmental policies might correct the inefficiency.

The fourth model (“MaGoodLife” model) tries to analyse the alternative macroeconomic outcomes of “Green Growth” and “DeGrowth” as the two possible equilibria of a dynamic macroeconomic model. We start from the standard economic growth model in which households care about consumption of produced market goods as well as about environmental quality and leisure. We allow for two types of

innovation: one that makes polluting goods cheaper (“brown innovation”) and the other that makes clean goods cheaper (“green innovation”). If pollution is priced sufficiently, innovators prefer green innovation over brown innovation and economic growth continuous without deteriorating environment – Green Growth. While technological innovation possibilities make green growth possible and attractive, another macroeconomic equilibrium might be both possible and desirable. Because of social externalities the macroeconomy could support an equilibrium with little production and little innovation but high environmental quality and abundant leisure time. This equilibrium becomes relevant if leisure is a social activity in which social interaction outside the working place is valued, and if leisure is valued higher if more environmental quality is available. Both of these assumptions in the model are supported by the literature review undertaken in WP3 and the outcomes of the focus groups, interviews and survey research in WP4.

#### **4.2 Key disciplinary innovations (Macroeconomics)**

The modelling presented above contributed to theory development in macroeconomics in several ways. In particular, we have integrated the modelling of time use and energy use in households, introduced tipping points and conspicuous conservation in macroeconomic growth models and developed a Macroeconomic theory of DeGrowth. Details are reported in Deliverable 6.2.

First, in economics, decisions regarding labour supply and leisure are studied separately from decisions regarding household energy use. In the MaSTU-model we developed a first integration of the two and make a connection to the notion of time pressure from the psychological literature. The results of our analysis also contribute to the discussion of rebound effects on a macroeconomic level. We find that reductions in energy consumption at household level are overridden through price effects stemming from lower energy prices and higher wages.

Second, in most applied macroeconomic analysis of climate change policy, the damages from climate change are modelled as incremental non-stochastic changes to utility or productivity (e.g. Nordhaus 2008, Golosov et al 2014). This ignores the disruptive nature of climate change and neglects tipping points. In the MaTiPCo model, climate tipping points are introduced in a macroeconomic model. We focus on the implications for consumption. Precautionary savings become optimal because of the risk of climate change. This implies that an essential part of climate policy is to reduce household consumption and save more in the prospect of climate change. While the existing macroeconomic literature stresses the role of energy reductions, our analysis shows that consumption reduction is also important.

Third, there is a tradition to model status-driven consumption, “conspicuous consumption”, in growth models. Typically the result is that this motive increases the economic growth rate and leads to overconsumption. In the 4C model that was

developed in GLAMURS, we extend this strand of literature by refining the concept of status-driven household expenditures. Since households can choose between many different spending categories it matters for which type of spending categories they are most prone to the status motive. We study “conspicuous conservation”, i.e. status-driven pro-environment household expenditures. Part of the literature results are reverted in the sense that overconsumption (of aggregate consumption expenditure) might vanish.

Fourth, macroeconomic growth models typically focus on long-term growth driven by innovation and increased material use. An alternative to this traditional growth pattern is studied under the heading of “Green Growth” (e.g. Smulders et al 2014). Yet, this view on the future of growth is still within the boundaries of traditional economic systems with innovation driven by market size in the global market and households in a passive role. The alternative view of “DeGrowth” was developed (e.g. Kallis, 2011) as a criticism of traditional growth patterns, but has not been formalized in macroeconomic growth models (Victor, 2011) provides an empirical-macroeconomic model). In the MaGoodLife model of GLAMURS we do exactly this. The model is based on the case study and back-casting results of GLAMURS. The model helps us identify conditions under which Green Growth and DeGrowth can arise as multiple equilibria.

Fifth and more generally, the macroeconomic GLAMURS modelling has systematically introduced social dynamics in macroeconomic models, which are typically neglected in the economics literature. The contribution is that we can link sustainable behaviour to coordination failures at the macroeconomic level. While the existing literature emphasized coordination of policies and avoiding free-riding in an international context, we find that coordination among groups in society is also important. Multiple equilibria and tipping points arise because of complementarities between environmental externalities and social externalities.

#### **4.3 Interdisciplinary innovations: theoretical and methodological developments**

The macroeconomic models developed for GLAMURS combine economic drivers – mainly income, prices, and technology – with social dynamics, in particular identity-driven behaviours, habits, and social norms. This allows for richer models of sustainability transitions. In particular, while in traditional economic models shifts in preferences have to be taken as exogenous shocks, the insights from psychology allow to open up the black box of preference shifts.

To assess the effects of adopting sustainable lifestyles on the EU level, we linked macroeconomic modelling to the qualitative outcome (normative visions) of back-casting workshops and the quantitative outcomes of footprint calculations, aiming to increase the consistency of the lifestyle scenarios and assess possible rebound effects. In order to do so, we translated formulated lifestyles to taste shocks in macroeconomic models. This allows us to make predictions about how lifestyle changes impact on macroeconomic

variables (income, wage and prices) and to explore rebound effects from these responses. Milestone 33 and deliverable 6.2 report on the details.

The link between back-casting workshops and macroeconomic modelling can be regarded as a methodological interdisciplinary contribution. Where workshop participants formulate while typically unaware of macroeconomic constraints, the subsequent modelling of the resulting visions serves as a consistency check and feasibility check of the back-casting visions.

#### 4.4 Future research and open questions

The GLAMURS project has provided unique inputs from various disciplines into economic modelling. We have focused on how to aggregate developments at the level of individuals and communities to the macroeconomic level and how these levels interact. For future research we propose to further refine the various levels of aggregation and interaction. In particular, we propose to use a regional economics and urban economics perspective and bring in explicitly spatial economics. From the focus groups and the case studies (WP5), it becomes apparent that there is a very salient regional aspect to sustainability initiatives. Local self-sufficiency and community-based consumption and production are at the core of new approaches to sustainability. This implies that physical distances between consumers and producers, agglomeration, and transport costs matter a lot. It is exactly these issues that are studied in regional and urban economics.

Quantifying and assessing the feasibility and (macroeconomic) implications of radical lifestyle changes is difficult mainly because by their very nature radical future changes cannot be observed in current macroeconomic data. In GLAMURS we have used focus groups, questionnaires, and back-casting workshops to collect empirical information about people's intentions, aspirations, and driving motives. To a large degree, however, these methods inavoidably elicit - in the language of economists - "stated preferences" rather than "revealed preferences". Depending on the future physical, social, and economic environment, households may choose actions that deviate from what they now state as being desirable. To bridge the gap between stated preferences and actual context-specific actions, randomized controlled trials ("field experiments") can be used to test the effectiveness of various ways of influencing people's attitudes and behaviors in reducing their environmental footprints. Recently researchers have begun studying how framing of information (about for example environmental impacts) affects environmental behaviors – comparing environmental outcomes in randomly selected households in the treatment and control groups. The insights obtained in Glamurs can inspire how information can best be presented to influence environmental behaviors, habits and lifestyles. An example of such an approach is the work Glamurs did on analyzing the impact of three different types of policies on recycling behaviors in the city of Tilburg. Future research can build on the knowledge obtained herein by exploring how different means of information provision, using smart phone applications and social media, induce behavioral change in the domains of recycling behavior, energy usage, and meat consumption. The field-experimental interventions can be pre-tested in experimental economics labs, and laboratory experiments can also be used to gain deeper insights into the real-world mechanisms giving rise to the observed field outcomes.

## 5. ASSESSING THE ENVIRONMENTAL IMPACT OF LIFESTYLE CHOICES

### Highlights

- *The environmental footprint of households varies significantly across countries and within countries due to income structure, household size, level of education, climate, carbon intensity of the available energy mix and other social determinants.*
- *Information about the spatial distribution of impacts allows regions to monitor their own sustainability performance, evaluate policy outcomes and take into account consumption-based emissions in a broader set of development measures.*
- *Consumption patterns and their associated carbon emissions vary significantly between regions and grassroot initiatives within the region, highlighting the vanguard role of grassroot initiatives for experimenting and demonstrating how more sustainable lifestyles and behaviors can be adopted.*
- *Active and healthy sustainable lifestyles have the highest carbon mitigation potential.*
- *We linked core principles of industrial ecology research to the field of environmental psychology, social science and normative vision development.*

### 5.1 Objectives and work done

The environmental impact assessment work package of the GLAMURS project aimed to provide insights into the sustainability properties of both current (observed) and envisaged lifestyles. This was done in order to understand which lifestyle changes would contribute significantly to achieving the EU's sustainability targets and to highlight the necessity and efficacy of lifestyle changes for reaching global sustainability objectives. For these tasks, we developed novel assessment tools which link industrial ecology analysis methods (in particular environmentally extended multi-regional input output – EE MRIO - analysis) to (1) regional statistical data (household budget surveys), (2) the outcomes of sustainable lifestyle research in the environmental psychology field, and in particular the data obtained from the application of a survey covering 7 European regions, as part of WP4 (see Section 2.4. for the description of the interdisciplinary innovations of this work) and (3) qualitative visions established in backcasting exercises (as part of both WP4 and 5, and described in more detail in section 6 of this report).

First, in order to gain insights into about the current role of household consumption driving environmental impacts, we analyzed the material, water, and land-use requirements, as well as greenhouse gas emissions, associated with the production and use of products and services consumed by households (Ivanova et al., 2016). This research was based on an analysis of an EE MRIO database -EXIOBASE 2.2-

(Wood et al., 2015), thereby building upon the outcome of a previous EU fp7 project (CREEA, contract number 265134). The results highlight the importance of environmental pressure arising from household consumption (the footprints of households). This household consumption contributes to more than 60% of global GHG emissions and between 50% and 80% of total land, material, and water use. We found a robust and significant relationship between households' expenditure and their environmental impacts, driven by a rising demand of non-primary consumption items. Besides the peer-reviewed analysis (Ivanova et al., 2016), further information about the adopted method and results can be found in Deliverable 7.1 (Hertwich & Ivanova, 2015).

Household footprints are unevenly distributed across countries, with wealthier countries generating the most significant impacts per capita. Based on a subsequent analysis, we also found that households within the same country are not homogeneous. We based this conclusion on a novel linking of regional (177 EU regions) household budget surveys (HBS) collected from Eurostat and national statistical offices to the EE MRIO framework. This research makes a key contribution for the incorporation of consumption-based accounting into local decision-making. An interactive visualization of these results ([www.environmentalfootprints.com/regional](http://www.environmentalfootprints.com/regional)) allows citizens and policy makers to browse the results of this analysis. A more in-depth analysis focuses on the driving forces of regional carbon footprints through a set of socio-economic, geographic and technical factors (Ivanova et al., 2017). Income is singled out as the most important driver explaining 53% of the variance in the total carbon footprint and up to 66% and 62% in the domains of clothing and manufactured products. Additional factors that stand out as important on the regional level include household size, urban-rural typology, level of education, expenditure patterns, climate, resource availability and carbon intensity of the electricity mix. Further detailed information for each country including a GLAMURS case study can be found in Deliverable 7.2 (Vita et al., 2016a); individual factsheets can be downloaded at <http://glamurs.eu/results/>.

The regional analysis also provided the first step for the linking of EE MRIO analysis with individual survey data in order to assess the carbon footprint of GLAMURS case study regions and sustainability initiatives based on individual survey responses. The novelty and advantage of this link is that it adopts several footprint calculation methods depending on the survey's detail and consumption domain (top-down and bottom-up calculations). Based on the calculator results, we find that consumption patterns and their associated carbon emissions vary significantly between each region and the initiative within the region. If initiatives have carbon emissions higher than the regional average, it is due to increased emissions caused by either mobility or manufactured goods. This comparison can guide initiatives on how to further improve their actions to lower their environmental impacts. On the other side, most initiatives have significantly lower carbon emission associated with meat products compared to the regional average. Thus, initiatives demonstrate that

significant carbon emission savings are possible. This highlights the vanguard role of initiatives for experimenting and demonstrating how more sustainable lifestyles and behaviors can be adopted. Further information about these results can be found in Milestone 32 (Ivanova, Vita & Stadler, 2016) and Deliverable 7.3 (Vita et al, 2016b).

Throughout the GLAMURS project, we conducted workshops and backcasting exercises in the case study regions to develop normative scenarios and desirable visions for transitions to sustainable lifestyles and a green economy (Quist & Leising, 2016b). We then quantified these visions and their associated lifestyles and upscaled their effect to the EU level. This enables us to assess the mitigation potential of changing lifestyles and consumption patterns of European households and compare these effects to the potential of changing the background system (energy supply, transportation, material requirements of products, etc.). The later links the GLAMURS results to the ongoing fp7 project Carbon-CAP (grant agreement nr 603386), which analysis the effect of consumption-based policies on the EU level. We identified the changes with the highest mitigation potential, which are commonly associated with a more active (walking and biking instead of car use) and healthier (in terms of diet) lifestyles. Further information about these results can be found in Milestone 33 and Deliverable 7.3 (Vita et al, 2016b).

## 5.2 Key disciplinary innovations (Industrial Ecology)

The work accomplished during the GLAMURS project pushed the state-of-the-art in industrial ecology research in the following ways:

- 1) The analysis of several environmental impacts caused by household consumption updates and extends previous efforts (Hertwich & Ivanova, 2015; Ivanova et al, 2016). The first analysis of the carbon footprint of nations, identifying the role of households and specifying the role of different consumption categories as a function of income, was provided by Hertwich and Peters (2009) for the reference year 2001. The results have been updated and extended to other environmental stressors (Wiedmann et al., 2013; Kanemoto et al., 2014; Steen-Olsen et al., 2012), but most of this work focused on entire nations and not on understanding the role of households. While the national focus is appropriate for national and international policy making, household footprints provide insights into the social determinants of environmental impacts and can inform household actions directed towards reducing footprints. Household consumption has a strong relation with consumer behavior, lifestyles and daily routines and a potential resistance to change due to social and cultural embeddedness. The novelty of household impact assessment within the GLAMUR project is that it uses an integrated methodological framework across a set of footprint indicators (carbon, material, water, land) to evaluate household environmental performance. This research was based on an analysis of the EE MRIO database -EXIOBASE 2.2- (Wood et al., 2015) which features a higher level of detail on environmentally relevant sectors (e.g. agriculture, energy, manufacturing) and

environmental extensions (e.g. emissions, resource use and pollutants) in comparison to other MRIO databases (Wood et al., 2015). In addition, EXIOBASE has the major advantage in providing much greater product disaggregation (200 product sectors) in an integrated framework within the System of Environmental-Economic Accounting (SEEA) guidelines. EXIOBASE 2.2 is the outcome of a previous EU fp7 project (CREEA, contract number 265134) and thereby our works contributes to the integration and knowledge co-production across EU research projects. The integrative approach of the analysis allowed us to assess and compare environmental impacts of household consumption across indicators, regions and consumption categories. The results can further be used to identify where mitigation of certain impacts, for example, emission reductions, would come at the expense of other impact categories such as higher levels of water, land and material consumption. Our study provides a comprehensive insight about the environmental consequences of household purchasing decisions, and informs mitigation strategies about the consumption categories with the highest environmental relevance. The work goes beyond presenting a snapshot of household emissions and resource use, and provides a different perspective on footprint determinants and strategies for environmentally-driven reallocation of household spending. We conclude that behavioral changes may have a significant potential to balance economic growth with environmental performance.

- 2) An important task of GLAMURS was to explore the environmental impacts on a regional level. We accomplished this task by quantifying the household carbon, land, water and material footprints across 177 regions in EU27, thereby providing a higher spatial detail than any prior cross-country study (Hertwich & Peters, 2009; Ivanova et al., 2015). The results are based on a linking of household budget surveys (HBS) with an EE MRIO database (EXIOBASE 2.3). HBS gather and harmonize household expenditure information at EU level and are collected from Eurostat and the national statistics offices. It is broken down by regional unit (i.e. the EU's Nomenclature of Territorial Units for Statistics (NUTS) level 1 and level 2) and consumption unit (i.e. the UN's Classification of Individual Consumption by Purpose (COICOP) level 1-4). We aimed at exploring household footprints across NUTS 2 regions, which are generally the basic regions for the application of regional policies. France, Germany and the United Kingdom, however, report inter-regional expenditure across NUTS 1 subnational regions only, which are larger than NUTS 2 regions. Having collected regional averages of household expenditure from HBS, several reconciliation steps were conducted to bridge the survey data with the EXIOBASE product classification (Steen-Olsen et al., 2016). These optimized the expenditure allocation, share of underreporting and additional conversion steps (Ivanova et al., 2016). The results of these analysis are the first study to quantify region-level consumption-based GHG emissions associated with household consumption in a comprehensive framework across the European Union. It combines the use of regional consumer expenditure with the EE MRIO framework to trace impacts along the global supply chains. Information about the spatial distribution of impacts allows regions to monitor their own sustainability performance, evaluate policy outcomes and take into account consumption-based emissions in a broader set of development measures. Furthermore, the regression analysis tests the significance of potential footprint determinants in the EU and improves the understanding of the driving forces behind consumption-based emissions. For an effective dissemination of

the results and to provide a tool for policy makers and citizens to explore the results, we developed an interactive visualization of the results which can be accessed online ([www.environmentalfootprints.com/regional](http://www.environmentalfootprints.com/regional)). A detailed method description and further results can be found in Deliverable 7.2 (Vita et al., 2016a) and Ivanova et al. (2017).

We developed novel assessment framework which models the potential climate change mitigation potential of consumption-oriented policy measure and lifestyle changes (Wood et al., 2017). The framework utilises an input-output based model that provides broad economic coverage, as well as sectorial detail on individual initiatives. The framework allows assessing integrated policies for reducing greenhouse gases that combine changing consumption patterns with changes in the composition or manufacturing of the products demanded. The modelling can be based on any detailed multiregional input-output table that describes the global economy, thus reflecting the actual geographic distribution and emissions factors of global production networks. This framework provides the basis for the systematic analysis of the environmental consequences of the envisaged lifestyle changes obtained from the backcasting exercises within the GLAMURS project. It provides the insight into the importance of different consumption categories (like food, mobility, shelter) driving environmental impacts and thus allows to determine the potential of specific lifestyle changes for attaining a sustainable future. The described framework was co-developed and also applied to assess the policy options in the ongoing EU fp7 project Carbon-CAP (grant agreement nr 603386) as well as the Norwegian Research Projects Karbonfotspor and Peoples climate research (Norwegian Research Council Grants No 233698 and 235462, respectively), thereby providing a consistent assessment tools for lifestyle changes and policy mitigation efforts. Further information about the tool can be found in Deliverable 7.1 (Hertwich & Ivanova, 2015).

### **5.3 Interdisciplinary innovations: theoretical and methodological developments**

We developed a novel carbon footprint calculator in order to estimate the carbon footprint of GLAMURS case study regions and sustainability initiatives based on survey responses. Through the calculator, we link core principles of industrial ecology research to the field of environmental psychology and social science. The calculator provides the means for comparisons between the environmental performances of groups of individuals with different lifestyles and consumption patterns and the assessment of different options for carbon cuts. The novelty and advantage of the calculator is that it adopts several footprint calculation methods depending on the survey's detail and consumption domain (top-down and bottom-up calculations). It further applies a significant amount of background information from various data sources to estimate environmental intensities. As a result, our carbon footprint calculator applies research findings to improve the carbon footprinting practice of popular online footprint calculators. Finally, accurate footprint estimation is a prerequisite for the evaluation of potential footprint determinants. A combination of several methods was considered in the calculations of carbon footprint in order to employ the most suitable method for each consumption category. We adopted top-

down, bottom-up and region-adapted emission factors to deliver the most accurate calculations within the scope of the survey (kgCO<sub>2</sub>eq). Additional variables were further used to fine-tune the footprints in order to better reflect environmental benefits from different lifestyles. A detailed description of the calculator and its application to survey results can be found in Deliverable 7.2 (Vita et al., 2016a), Deliverable 7.3 (Vita et al., 2016b) and Milestone 32 (Ivanova, Vita & Stadler, 2016).

To assess the effects of adopting sustainable lifestyles on the EU level, we linked the quantitative methods of industrial ecology to the qualitative outcome (normative visions) of backcasting workshops. In order to do so, we translated formulated lifestyles to specific consumption patterns which can be analyzed through EE MRIO analysis. This ‘top-down’ perspective allows for backcasting modelling where different potential lifestyles are explored. In our analysis, we cover all visions formulated in the GLAMURS backcasting workshops, but since the model allowed for even more modelling scenarios, other sources have been adopted to exploit the full potential of the model in scanning lifestyle changes in regard to mitigation potential. In the systematic analysis, we also included over 100 specific environmental improvement suggestions on a European level formulated within the EU fp7 project Carbon-CAP (grant agreement nr 603386). Using the general description of each lifestyle vision, the material and consumption implications are formulated. This includes which products will be reduced or banned, what products will act as substitutes (consumption shift) and thus increase their demand, and if there are any industrial sectors affected by the changes. Using this information, the type of change the lifestyle implies is classified as (a) exclusively change at household level (direct change in consumption pattern – the most common type of lifestyle implication), (b) exclusive change at industry level (if the consumer has no direct ability to consume differently, but still a critical mass has power to change the way that the industry demands different products) or (c) change at both household and industry level. Importantly, our analysis also includes rebound effect (any systemic responses of consumers to a measure taken to reduce environmental impacts that offsets the effect of the measure, e.g. the effect of spending money saved due to switching to a sustainable lifestyle). A detailed description of the linking and the results of the lifestyle assessment can be found in Deliverable 7.2 (Vita et al., 2016a), Deliverable 7.3 (Vita et al., 2016b) and Milestone 33.

#### **5.4 Future research and open questions**

The GLAMURS project led to multiple findings which help us to understand the environmental benefits of sustainable lifestyles. Based on these results, we can formulate new research topics which aim to extend our knowledge about the role of lifestyles for enabling a green society.

- In GLAMURS we used a static analysis with 2007 as base year. This was determined by the use of EXIOBASE 2 as underlying EE MRIO. In the meantime,

time series of highly detailed EE MRIO tables have been made available. Implementing this new EE MRIO will allow us to analyze the role of consumption patterns, the economic structure and efficiency as well trade relationships over time and identify which factors determined the observed changes in the environmental footprints of households. Based on these results, prospective models can be developed which would lead to the formulation of policy recommendations on how to navigate through the potential future to ensure a sustainable society.

- The switch to a green economy implies the strengthening of environmentally-friendly (green) economic sectors. Some of these sectors, in particular several renewable energy production sectors, are already included in the used EE MRIO framework EXIOBASE. For others, like vegetarian restaurants or organic farming, we relied on assumptions in order to obtain the presented results. With more data becoming available, we propose a framework to split the traditional sectors like agriculture into a “traditional” and a “green”/“organic” sector. Besides a better representation of consumption patterns, such a framework would also allow to analyze the economic effects (e.g. in term of job creation or effects of value added per sector) of a switch to a green economy.

The GLAMURS project provided a unique environment which allowed researchers of different disciplines to work together on urgent sustainability topics. This led to stimulating scientific discussion and exchange of ideas. Based on these, we also propose to pursue the following lines of research:

- Agent based modelling provides a simulated environment to analyze the effects of policies and lifestyle changes on individual actors (e.g. humans, households). With the framework established in GLAMURS, we are now able to link the simulated environment to the EE MRIO analysis methods, thereby providing a way to investigate the global consequences of local policy implementations or lifestyle changes.
- In GLAMURS, we analyzed the environmental benefits of grassroot initiatives memberships in terms of carbon emissions. Environmental sustainability, however, consists of multiple components (e.g. land use, material requirements, water use, etc). Based on the lessons learned in GLAMURS, new surveys can be designed to assess the multi-dimensional components of initiative membership. This would allow to link the initiatives into the comprehensive regional analysis provided by the HBS-MRIO connection.

## 6. PARTICIPATORY FUTURE VISION DEVELOPMENT AND ASSESSMENT: FOCUSING ON NOVELTIES IN THE INTEGRATION OF CONCEPTS AND MODELLING METHODOLOGIES

### Highlights

- A *participatory backcasting methodology* has been developed for sustainable lifestyles and a green economy. It has been applied in the seven regions studied in the Glamurs project.
- It consists of two series of stakeholder workshops; a first series of workshops for vision development and a second series of workshops focussing on pathways and implementation.
- Totally, fourteen visions and related pathways have been generated.
- Three major clusters of visions emerged: (i) rural sufficiency (ii), urban sufficiency, (iii) urban growth visions, apart from (iv) two “miscellaneous” visions.
- The visions have been fed into economic modelling in order to assess the implications of sufficiency-oriented visions versus green growth oriented visions
- The Scottish vision has been fed into Agent-Based modelling using the decline of the Aberdeen oil Industry as an additional starting point
- The visions have been used to identify key lifestyle elements and assess their environmental benefits (see Section 5)

### 6.1 Objectives and work done

The backcasting work in the Glamurs work consisted of T4.3 and T5.2. In the DOW, T4.3 is described as follows. To conduct exploratory backcasting scenario workshops for future sustainable lifestyles for all case study regions in order to achieve sustainability targets at the level of lifestyles. This task will provide an input for the assessments of alternative future scenarios in WP6 for economic modelling and WP7 for environmental analysis, and includes combinations of changes in technology, lifestyles and economic structure. Activities for T4.3 included:

- Develop backcasting scenario workshop methodology in alignment with T5.3.
- Organise and conduct backcasting workshops in the seven regions under study involving a range of relevant stakeholders for developing normative backcasting scenarios based on sustainability targets at the level of lifestyles and identifying technological, lifestyle, behavioural, and institutional changes required for realizing the scenarios.
- Analyse the results of the backcasting scenarios and feed them into WP6 and WP7, followed by a cross-case comparison of results and process.

T5.3 is described as follows in the DoW. It comprises conducting backcasting pathways and implementation workshops for future integrated sustainable lifestyles for each case study region. The backcasting pathways and implementation workshops conducted in each of the case study regions will build on the results from the qualitative and the quantitative analyses in WP 4 and 5 and will involve relevant stakeholders in each region. The workshops will focus on how to diffuse, mainstream and integrate sustainable practices and lifestyles through developing transition pathways and implementation agendas and how these can contribute to the backcasting scenarios developed in T4.3. The task consists of:

- Developing backcasting pathways and implementation workshop methods for the lifestyle niches as a follow up of Task 4.3;
- Conducting backcasting pathways and implementation workshops in each of the case study regions, and
- Report and summarise results of the workshops and make a cross-case evaluation.

Main results and deliverables are as follows:

- (i) Overview of recent developments in participatory backcasting for sustainable consumption and local settings, which was used for (ii) development and description of a participatory backcasting methodology for sustainable lifestyles and a green economy, which is part of Deliverable 4.3: Report on future lifestyle scenarios and backcasting vision workshops (Quist and Leising 2016a)
- Deliverable 4.3 Report on future lifestyle scenarios and backcasting vision workshops (Quist and Leising 2016a), which reports (i) on the developed backcasting methodology, (ii) on all vision workshops and the further elaborated visions, and (iii) provides a cross-case comparison of all workshop results, in terms of process, methods, and content of the visions
- Deliverable 5.2, Report on future lifestyle pathways and workshops, (Quist and Leising 2016b), which reports on (i) on all pathways workshops and the further elaborated pathways, and (ii) provides a cross-case comparison of all workshop results, in terms of process, methods, and content of the backcasting analysis and pathways

## 6.2 Key disciplinary innovations (Back-casting)

Whereas participatory backcasting is transdisciplinary and interdisciplinary in itself, due to engagement of stakeholders, and bringing experts from different disciplines together with representatives from civil society, grassroots organisations, government, and business, we report the novelty in the backcasting methodology under disciplinary innovations and results are reported in D4.3 and D5.2 (Quist and Leising 2016a & 2016b).

A major methodological innovation is about combining sustainable consumption and sustainable lifestyles in one framework with a green economy. In backcasting it is more custom 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.

A second innovation in applying the developed backcasting methodology was that workshops gathered representatives from local bottom-up sustainability initiatives together with experts, policymakers, and sometimes businesses. Usually, networks and meetings of very ambitious and critical bottom-up initiatives are separate from more regular stakeholder workshops involving policymakers, experts and business. By contrast, in the GLamurs backcasting workshops these different stakeholder groups were brought together and worked together on developing more widely shared visions for sustainable lifestyles under different economic contexts, which is a great result and was the outcome of in-depth processes of knowledge co-production (see also Deliverable 2.1 for a more detailed account).

A third innovation consists of application of both basic and advanced tools and methods in the developed workshop formats. Whereas a complete workshop format was developed, it was also possible to apply other tools and methods that could meet the same requirements and objectives. This kind of flexibility in tools and methods is important in order to adjust to different cultural contexts, as well as to take into account expertise and capabilities of local researchers and facilitators. This enabled us to extend the toolkit for conducting backcasting workshops and to enrich the available repertoire of tools and methods for backcasting workshops.

### **6.3 Interdisciplinary innovations: theoretical and methodological developments**

The interdisciplinary innovations consist of using the workshop vision and pathway results for economic modelling, agent-based modelling and environmental assessment of future lifestyles. Though backcasting can be combined with different kinds of modelling, it has until now hardly been combined with economic modelling or agent-based modelling. For combining backcasting scenarios with economic modelling only one journal paper could be found (Ahlroth and Höjer 2007) and for

combining backcasting with agent-based modelling only a few journal papers could be found, most notably van Berkel, D.B., Verburg, P.H. (2012), and Garcia-Mira et al (2016).

To assess the effects of adopting sustainable lifestyles on the EU level, we linked macroeconomic modelling to the qualitative outcome (normative visions) of backcasting workshops and the quantitative outcomes of footprint calculations, aiming to increase the consistency of the lifestyle scenarios and assess possible rebound effects. In order to do so, we translated formulated lifestyles to taste shocks in macroeconomic models. This allows us to make predictions about how the lifestyle changes impact on the macroeconomic variables (income, wage and prices) and to explore rebound effects from these responses. Milestone 33 and deliverable 6.2 report on the details. The link between back-casting workshops and macroeconomic modelling can be regarded as a methodological interdisciplinary contribution. Where workshop participants formulations are typically unaware of macroeconomic constraints, the subsequent modelling of the resulting visions serves as a consistency check and feasibility check of the back-casting visions.

To assess the effects of adopting sustainable lifestyles on the EU level, we linked the quantitative methods of industrial ecology to the qualitative outcome (normative visions) of backcasting workshops. In order to do so, we translated formulated lifestyles to specific consumption patterns which can be analyzed through EE MRIO analysis. This ‘top-down’ perspective allows for backcasting modelling where different potential lifestyles are explored. In our analysis, we cover all visions formulated in the GLAMURS backcasting workshops, but since the model allowed for even more modelling scenarios, other sources have been adopted to exploit the full potential of the model in scanning lifestyle changes in regard to mitigation potential (as already described in section 5.3 above).

## **6.4 Future research and open questions**

A first suggestion for future research is to elaborate the different clusters of visions further in order to develop pathways and recommendations that have not only broader relevance for countries in Europe, but also have relevance at the European level.

Further development of environmental evaluation methodologies in such a way that full visions and scenarios for sustainable lifestyles and a green economy can be assessed more comprehensively in terms of their environmental implications and improvements is still required and would make a very interesting contribution to the analysis of transitions to sustainability.

Further development of economic modelling methods in a way that allows for the more radical backcasting visions to be tested on their economic implications, but

also on their social effects and wellbeing implications is needed. Beyond such methodological advances, experimentation through social and urban demonstration projects of elements of future visions and systematic monitoring and assessment in terms of their environmental, social, health and macro-economic effects (if upscaled) is highly desirable.

For future research we also propose to develop new tools through which workshop participants can more interactively receive information about the economic implications of their choices and visions. Participants can either be presented with the economic modelling of their initial-session visions in a subsequent workshop, or, alternatively, workshops with different groups are held sequentially and each group can start from the visions of the previous group including the economic modelling of these visions. The result would be a cascade of visions-modelling interactions, which would result in a fertile social participation strategy for sustainability-relevant decision-making and could be integrated in policy development plans. As a further alternative, we propose transposing macroeconomic and agent-based simulation models to macroeconomics serious games, which participants can use as a tool to feed and build their own vision. In such a serious macroeconomics game, players compete against each other and at the same time learn about feedback from the macroeconomy. The game could be based on a simulation model in which the players can set policy parameters and decision variables for subsets of agents in the model. Both economic modelling and environmental analysis should be included earlier in the backcastign methodology, so that their results can enrich stakeholder dialogues on implications and set priorities for roadmaps towards developed visions and the implementation of elements from developed visions.

## 7. POLICY AND GOVERNANCE THEORIES FOR SUSTAINABILITY TRANSITIONS

### Highlights

- *Policy and governance theories for sustainability transitions give insufficient consideration to the complex psychological dimension of individual behaviour and behavioural change.*
- *More research is needed on how individuals can be empowered to cope with the common phenomenon of sustainability-related intrapersonal conflicts.*
- *Classical governance modes favour the avoidance of conflicts, problem-focused coping, and deliberative models of decision-making. Governance modes that overtly strengthen conflict coping, address emotion-focused coping and trigger automatic models of decision-making could enrich sustainability governance.*
- *Four macroeconomic growth models were used to analyse how policies can enhance – and interact with – lifestyle changes.*
- *The macroeconomic policy scenarios suggest that price policies (emission taxes and financial rewards for environmentally sustainable behaviour) remain important even in the presence of very strong autonomous individual lifestyle shifts and social contagion effects.*

### 7.1 Objectives and work done

Task 3.3 focused on individuals with a motivation to act sustainably who experience conflicts about decisions with different impacts on sustainability and aimed to explore what types of coping and decision-making current governance modes may trigger and what types of governance modes may be required to support individuals deal with such conflicts.

As many of the interviews conducted in the case studies of the GLAMURS project revealed, such intrapersonal conflicts (IC) are a common phenomenon among people who want to live more sustainably. While many of them have a strong motivation to contribute towards a more sustainable future, they often experience challenges when different motivations compete with one another in the process of taking decisions on environmentally or socially relevant behaviours. Such conflicts may hinder individuals wanting to live more sustainably from doing so and may lead to psychological lock-in states.

The analysis in this task was guided by an interdisciplinary approach, combining psychology and political science, in order to investigate whether – and if so, how – specific governance modes or mechanisms could address intrapersonal sustainability conflicts. We explored how models and theories from psychology can enrich governance theories about sustainability transitions, mainly through knowledge about individual coping with sustainability-related conflicts. We first took a psychological perspective on sustainability-related intrapersonal conflicts, followed

by an overview of different governance approaches, and an attempt at combining the two.

Task 3.3 thus shed light on the missing but complex psychological dimension of individual behaviour in research on transition-related governance and provided a useful complement to current research. Psychological theories about sustainability have a strong focus on external influences on people's behavioural intention or behaviour. We therefore looked more thoroughly at the role of fundamental needs and values, which are important causes for motivational conflicts within individuals. For this part, thorough discussions between psychologists and philosophers in the project proved very fruitful.

Our first theoretical starting point was a conceptualization of needs and values as roots of intrapersonal conflicts. Broadly speaking, needs and values are on a deeper or more abstract psychological level than commonly studied psychological factors such as norms, attitudes, or intentions. Psychological theories and models prefer to portray factors influencing sustainable behaviour that can be operationalised and thus measured. Since no integrating psychological approach exists on needs and values, we made use of other approaches, such as the one by human development researcher Sabine Alkire who worked on the overlap between different concepts of dimensions of human flourishing as most fundamental reasons to act (Alkire 2002). Some prominent approaches on needs can also be found in the field of ecological economics. These approaches typically take a specified list of needs, based on Maslow, as a basis for participatory or analytical work (Max-Neef 1991, Camfield et al. 2010, Guillen-Royo 2010, Rauschmayer et al. 2011). They distinguish between abstract, universal needs and concrete, negotiable strategies to realise these needs.

Values are understood by psychologists as general preferences for end states or ways of acting; they serve as goals and guiding principles that apply across different contexts and underlie more specific attitudes, preferences, and behaviours (Clayton 2009; Schwartz 1992: 21). Values are often referred to but hardly ever operationalised. They could be considered as the deepest or most abstract level of motivational force a person can consciously refer to. Although they are supposed to be closely connected to needs, there is no psychological theoretical analysis of this potential relationship. Psychologists have suggested different models in which values feature prominently. For instance, in the value-belief-norm theory of environmentalism, Stern (2000) distinguishes between egoistic, altruistic and biospheric values, i.e. referring to the entity the value is oriented onto. Bilsky and Schwartz (1994), by contrast, refer to the content of values, describing two orthogonal value dimensions with opposing poles (openness to change versus conservatism, self-transcendence versus self-enhancement), hosting nine types of values (power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, conformity/tradition, security). Comparing basic reasons to act identified in cross-cultural studies in different academic disciplines, Alkire (2002) finds more substantial overlap than differences in the studies' dimensions. Conflicts

appear when the choice between different actions depends on culture, age, resources, gender etc. Shifts to more sustainable lifestyles may take place through choice and implementation of alternative strategies to achieve the same level of flourishing.

To find appropriate governance structures to deal with ICs, it is important to note that ICs, especially psychological lock-ins, are experienced both cognitively and emotionally. We assumed that ICs are indicated or mediated by unpleasant emotions or by a set of conflicting emotions. If ICs are experienced by activating emotions (e.g. anger, frustration) appropriate governance structures could help to express this emotion and to resolve the IC. If ICs are experienced through paralysing emotions (e.g. anxiety, despair) governance structures may help to provide space to express these emotions and support the coping process into the direction of sustainable behaviour.

Our second theoretical starting point consisted of the large body of research on how people cope with ICs, which mostly stems from clinical psychology. According to the transactional stress model (Lazarus et al., 1981), which is the most common coping model (Skinner et al. 2003), individuals typically use one of two ways of coping: problem-focused coping strategies (confronting the problem and changing the behaviour that causes the problem or looking for information on how to deal with it) or emotion-focused coping (dealing with the unpleasant emotions associated with the IC without changing behaviour). While a lot of emotion-focussed coping strategies have been identified, they have rarely been applied to explain pro-sustainable behaviour. Notable exceptions include Crompton et al. (2009) and Stich & Wagner (2012), who identify emotion-focussed coping strategies in conflicts about sustainable behaviour. These strategies include denial, relativisation, searching for counter-arguments, distortion, denial of responsibility, accusation, projection, limiting exposure to negative emotions, staying in the present with ones thoughts, turning attention to little positive things, searching for pleasure, and apathy. Crompton and Kasser (2009) propose a strategy to effectively cope with ICs about sustainable behaviour. At first, emotion-focused coping strategies are detected and associated unpleasant emotions are aroused. Next, the person experiencing the IC tries to accept his unpleasant emotions and is strongly supported by an empathetic listener. Finally, the person and his supporter search for new problem-focused coping strategies that reduce ICs and lead to more sustainability. This approach assumes that unsustainable behavioural strategies can be exchanged for sustainable strategies that can equally fulfil needs and values. The approach is still rarely implemented.

## **7.2 Key disciplinary innovations (Environmental Psychology and Political Science)**

In the discipline of psychology the main innovations included:

- a deeper and more philosophical encounter with the concepts of needs and values which enriched the psychological understanding of these terms and helped us understand why the field has so far not touched upon the sustainability-related question of how to find pro-sustainable ways of fulfilling needs without suffering from intrapersonal conflicts.
- a first attempt at analysing what kinds of governance implications different coping strategies with sustainability-related ICs may imply

In the field of political science/ governance studies, the main innovations included:

- The exploration of new psychology-informed governance approaches that may empower people to cope individually and collectively with such conflicts in ways that foster sustainability-enhancing behaviour
- Enriching the standard literature on policy and governance theories for sustainability transitions with psychological knowledge on complex intrapersonal processes that may occur at the individual level in sustainability-related contexts (conflicts and coping)
- Investigating an innovative question for governance research, namely whether – and if so, how – specific governance modes or mechanisms can address intrapersonal sustainability conflicts.
- Exploring how models and theories from psychology can enrich governance theories about sustainability transitions through a look at individual coping with sustainability-related conflicts.

### **7.3 Interdisciplinary innovations: theoretical and methodological developments**

In relation to the overall workflow of GLAMURS, task 3.3 provided the basis on which the governance-related interview questions in Work Package 5 were chosen and framed. The work in this task was purely analytical, drawing on intensive discussions between philosophers, governance experts and psychologists.

Enhancing governance theories and policy tools through the use of psychological models and realistic assumptions about human behaviour is a development that begun in the late 1990s. Yet despite major advances in fields such as behavioural economics and cognitive design, transition governance studies are still lagging behind in digging into this debate and drawing lessons in order to further its own objectives. Based on a multi-disciplinary approach, we understand human behaviour not necessarily as arising from rational choice, but instead consider a wider range of psychological mechanisms, including both emotions and cognitions, that help us to better understand why people behave the way they do.

Task 3.3 suggested one way to think about alternative environmental governance approaches in transition studies, starting from the common phenomenon of intrapersonal conflicts related to sustainable behaviour in transition contexts and drawing on psychological models of behaviour. To explain the idea of IC, we referred to the Motivation-Opportunity-Ability model, introduced by Ölander and Thøgersen (1995) as a synthesis of what is known. The model assumes three main classes of

factors to influence pro-environmental behaviour, namely personal motivation, situational opportunities, and appropriate individual abilities. We defined intrapersonal conflicts as situations in which different and incompatible motivations compete with each other, i.e., when the pursuit of one motivation interferes with the pursuit of another motivation, i.e. the person wants two mutually exclusive entities.

This incompatibility of motivations may lead to incompatible behavioural strategies, and thus possibly hinder an individual who wants to live more sustainably from doing so. If this motivational conflict has been present for a long time and no resolution is in sight, we call it a psychological lock-in (or motivational lock-in) (Table 1). By contrast, we consider a conflict between a certain motivation and the necessary abilities and/or opportunities to convert it into a suitable behaviour an is-ought discrepancy. Here, the person is clear about the ought-state and the respective behavioural strategy. In other words: the person wants to act but is hindered by his or her own abilities or by the situational opportunities. If this implementation conflict has been present for a long time or no resolution is in sight, we call it a socio-economic or physical lock-in. We depict ICs as a mental cage in which the individual feels trapped because every possible behavioural strategy would violate some of his motivations and satisfy others.

Taking ICs related to sustainable behaviour as a starting point to think about new environmental governance approaches, current governance approaches can be understood as ways to deal with is-ought discrepancies on a societal level. Governance can influence both opportunities to act (e.g. through taxes, laws, economic incentives, technological solutions, infrastructure, or nudges), and abilities to act (e.g. through education and information). However, governance aimed at resolving intrapersonal, i.e. motivational conflicts to behave pro-sustainably, are almost non-existent or at least not explicitly designed to do so (Table 1).

Table 1. Intrapersonal conflicts, discrepancies and related governance approaches

	Motivation	Opportunity	Ability
<b>Problem</b>	Intrapersonal conflict	Is-ought discrepancy	Is-ought discrepancy
<b>Motivation</b>	<b>Lock-in</b> Psychological lock-in	Socio-economic physical lock-in	Socio-economic physical lock-in
<b>Governance:</b>	Almost non-existent <b>innovative approaches</b> (to address conflict explicitly)	↓ Often considered (e.g. taxes, laws, economic incentives, technological solutions, infrastructure, information)	↓ Somewhat considered (e.g. education, information)

The literature on governance processes for sustainability transitions is largely shaped by economic, political sciences and sociological perspectives (Sandström 2009) and tends to ignore insights from psychology that could help to better understand what motivates individual behaviour. In order to find or devise psychology-informed governance approaches for sustainability transitions, we distinguished between governance modes that denote broad categories of ‘doing’ governance, and governance mechanisms, i.e., very specific types of policies or interventions that reflect a certain mode.

In the literature, there are several classifications of governance modes. Some of these limit themselves to policy instruments, distinguishing, for example, between regulations, economic means and information (Bemelmans-Videc et al. 1998) and thus adopting a rather government-centric point of view. Other approaches do not necessarily involve the government, such as collective action (Ostrom 1990). Increasingly, research explores and investigates the workings of more complex forms of governance that often involve hybrids of previously described categories, such as adaptive co-governance. Some of these, for example reflexive governance (Voß and Bornemann 2011), have not been deliberately implemented in practice yet, but could contribute to the governance of sustainability transitions in the future. We provided an overview of governance modes relevant to the study of sustainability governance (see D. 3.3, table 2).

The main theoretical development at this stage was to distinguish two ways in which governance modes influence intrapersonal conflicts: On the one hand, many rather classical modes contribute to structure society in a way that reduces individuals’ exposition to IC on how to behave. On the other hand, governance measures like these do not primarily intend to empower individuals to cope with their conflicts.

What can transition management (as a general governance approach) learn from this perspective on ICs? Current work on governance of sustainability transitions focuses on interactions in between niches or between niches and regimes. Individuals have not been in the main focus of transition research or transition management so far (Rauschmayer et al. 2015). Considering the effects of sustainability transition governance modes on those individuals who constitute the niches or who are meant to adapt their behaviour through the adoption of niche practices, could provide interesting insights for new governance mechanisms. Loorbach (2014) differentiates between three different basic transition support mechanisms: bottom-up innovation, top-down guidance, and phase-out support. These mechanisms are to be implemented in a “non-linear government” (ibid.: 56) and mainly contain elements of collective action, co-governance, reflexive governance, and technological interventions. All these modes concentrate on problem-focused coping and system 2 decision-making. A broader consideration, including emotion-focused coping and system 1 decision-making could strengthen transition governance.

Instead of assuming mainly on rational ways of decision making, governance modes must acknowledge that intrapersonal conflicts about sustainability exist and that some of them are experienced through emotions such as anger, frustration, anxiety or despair. It is worth researching what kinds of structures, settings or institutions may help individuals to express these emotions and what may support the resolution of intrapersonal conflicts. Those structures could be designed for the collective or individual level, for example through trainings that aim to increase awareness of such conflicts and the capacity to cope with them in pro-sustainably ways. Especially structures and processes at the societal level will require a strong amount of trust and neutrality.

### **7.5 Future research and open questions**

Intrapersonal conflicts in sustainability transitions and related attempts to find psychology-informed governance approaches to address this phenomenon are a completely new topic in the field of transition research. Therefore, numerous questions are still open, and a great potential exists for future research. We suggest and summarise five main points.

First, apart from the therapeutic approach proposed by Crompton and Kasser (2009) described above, the connected conversations approach by the New Economics Foundation (NEF), the carbon conversations approach by Rosemary Randall and hints to group support and mindfulness training (e.g. Lilley et al. 2014), we are not aware of attempts to connect the resolution of ICs and sustainable action. This is an important area for future research.

Second, more research is needed on the many ways in which individuals can be empowered to cope with their sustainability-related ICs. Classical governance modes favour (a) the avoidance of intrapersonal conflicts, problem-focused coping and (c) deliberative models of decision-making. For example, the promulgation and enforcement of social norms targets the automatic, system-1 model of decision-making and can facilitate emotion-focused coping. The nudge approach also targets automatic systems and can be used to avoid conflicts. What is missing are governance modes and mechanisms that support coping with IC, in particular including emotional coping, and that also address system-1 decision making.

Third, it is open what kinds of structures, settings or institutions could ensure a trusted space of neutrality as well as a directedness and commitment towards sustainability.

Fourth, it is open what combination of governance modes can strengthen the capacity of transition niche members to deal with their IC pro-sustainably and in such a way that this capacity does not get lost but strengthened by the process of niche mainstreaming.

Finally, it is open how to design such combinations so that they result in structural and self-reinforcing changes at the regime level.

## 8. CONCLUSIONS

The GLAMURS Project undertook a highly ambitious programme of research that included integrating theory and concepts across disciplines, carrying out in-depth empirical research in seven European regions on the determinants of sustainable lifestyles and transitions to a green economy, and quantifying models in simulations of the dynamics of sustainable lifestyle spread, in which several scenarios and policy options could be tested. By adopting such an approach, we could explore transitions to sustainable lifestyles in a dynamic way and shed light on the barriers to, and drivers of the adoption and spread of sustainable lifestyles at individual, meso- and macro- levels. We have thus addressed the demand side of transitions to sustainable lifestyles but did so in a way that took into account the complexity of factors influencing such a transition and the non-linear dynamics involved.

Such a comprehensive and integrated approach required significant interdisciplinary and transdisciplinary collaborations, across psychology, micro- and macro-economics, political science, transition studies, industrial ecology and agent-based modeling. In order for such collaborations to be possible, activities and tasks were programmed across the life of the project that targeted conceptual clarifications, sharing theories and understanding how the same phenomenon was approached and understood using different concepts. Both overlap and dissimilarity in concepts and theories had to be identified for cross-disciplinary dialogue to be possible. Besides the activities programmed at the start of the project, additional workshops and sessions at Consortium meetings were consistently added when deemed necessary, in order for a truly integrated approach that would shed light on the dynamics of transitions to sustainable lifestyles to be possible. WP3 has been dedicated to the integration of theory and ensuring adequate feedback between the theoretical, empirical and simulations' parts of the project. Different parts of this theoretical work has been already reported (see Del 3.1, 3.2 and 3.3).

The present report synthesizes the theoretical innovations of GLAMURS, both for particular disciplines, as well as, perhaps more importantly, the knowledge innovations stemming out of interdisciplinary collaborations. After taking stock of how the work carried out in GLAMURS has advanced the state of the art of theory on the conditions needed to achieve transitions to sustainable lifestyles and a green economy, we also point out to promising future research avenues and open questions. Taken together, these next steps constitute a future research agenda for the exploration of radical lifestyle transformation, that challenges the very core of our assumptions about a good life and about economic organization in the pursuit of welfare and wellbeing.

We emphasize the investigation of and demonstration experiments for alternative patterns of time-use that rely on alternative organization of work and leisure, the assessment of alternative economic models and experimentation with local economic systems and initiatives, further inquiry and simulation of social, economic and environmental tipping points, and further exploration of the environmental footprint of household consumption and of different stages of sustainable lifestyle change.

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