RESEARCH
FOR LOW CARBON
INITIATIVES

Final publishable summary report

1. An executive summary

The overall goal of the TESS project was to provide an understanding on the up-scaling possibilities of community-based initiatives with a high innovation potential towards sustainability. To do so, the project sought to answer two major questions:

1) What is the impact of community-based initiatives in terms of their carbon reduction potential and their economic effect?
2) What institutional structures (values, policies and mechanisms) support these initiatives in persisting beyond the initial phase and moving into an acceleration phase, spreading desired impacts?

To answer these two questions, the TESS project integrated both the natural and social sciences, and used both quantitative and qualitative data through interviews and surveys with 63 community-based initiatives from city of Rome, part of the city region of Berlin, the region of Catalunya and the countries of Finland, Romania and Scotland in Europe. The main outcomes of this research include: 1) a novel, innovative application for case selection in multi-disciplinary and multinational case studies, 2) the quantification of greenhouse gas (GHG) emissions for case study CBIs across Europe, 3) a framework for assessing wider impact of community-based initiatives, 4) an analysis of success factors and constraints for transition trajectories, 5) an integration of the environmental analysis of CBIs with an analysis of their economic, social, political and innovative dimensions and impacts, 5) policy recommendations for policymakers and other stakeholders and 6) engagement with stakeholders throughout the project, 8 ISI scientific publications so far and two accepted special issues (Final publication of the project: Regional Environmental Change/ Springer, 9 planned papers, Special issue of policy aspects: Environmental Innovation and Societal Transitions/Elsevier, 9 planned papers).

Findings from the examination of the TESS case studies include that initiatives which provide sustainable electricity, heat, personal transport, and vegetarian/vegan meals have the highest potential for climate change mitigation. Moreover, CBIs use a variety of means to generate income, but nevertheless often rely heavily on voluntary labor. CBIs have the capacity to deliver tangible economic benefits and most CBIs participate in substantial social engagement, however the ability for CBIs to reach a diversity of beneficiaries is low considering their aims. CBIs are both socially and economically innovative, but are skeptical of the ability of technological innovations and top-down policies to spark sustainability transitions. Finally, TESS found that often only the tangible impacts of CBIs, such as direct environmental or economic impacts, are considered and used as a measure of success for the initiatives. Meanwhile it is the intangible impacts, such as educational activities and improvements in well-being, that are the most durable and long lasting. ■

2. A summary description of project context and objectives

To replace current, carbon-based economies and avert dangerous climate change, a transition to a low-carbon society is urgently needed. This shift will need to occur at multiple scales, driven by governments, businesses, and communities. Across Europe, grassroots community-led initiatives have emerged to deal with the many challenges of the early 21st century at a local level. Because of their relative independence from institutional and political constraints, community-based initiatives (CBIs) have the potential to be less constrained by structural processes than top-down policies for transitions and can spur large-scale changes. However, little is known about the potential of community-based initiatives to generate beneficial impacts for climate and society as well as their to take a lead in creating the fertile ground for this transformational change has yet to be examined in detail.

Therefore, TESS (Towards European Societal Sustainability) was carried out as a European research project to explore the role of community-based initiatives in transitioning to a sustainable and low-carbon Europe (see figure 1). The project brought together natural and social scientists, and over its three years, over 40 researchers from eight partners have contributed to the project. It developed methodologies and tools for monitoring and reporting the social, political, economic, technological and environmental impacts of CBIs as well as their carbon emissions savings. These methods were designed to produce systematic and comparable results across Europe. TESS also examined initiatives' success and growth to determine how policy could encourage the further the development of grassroots action across the EU.

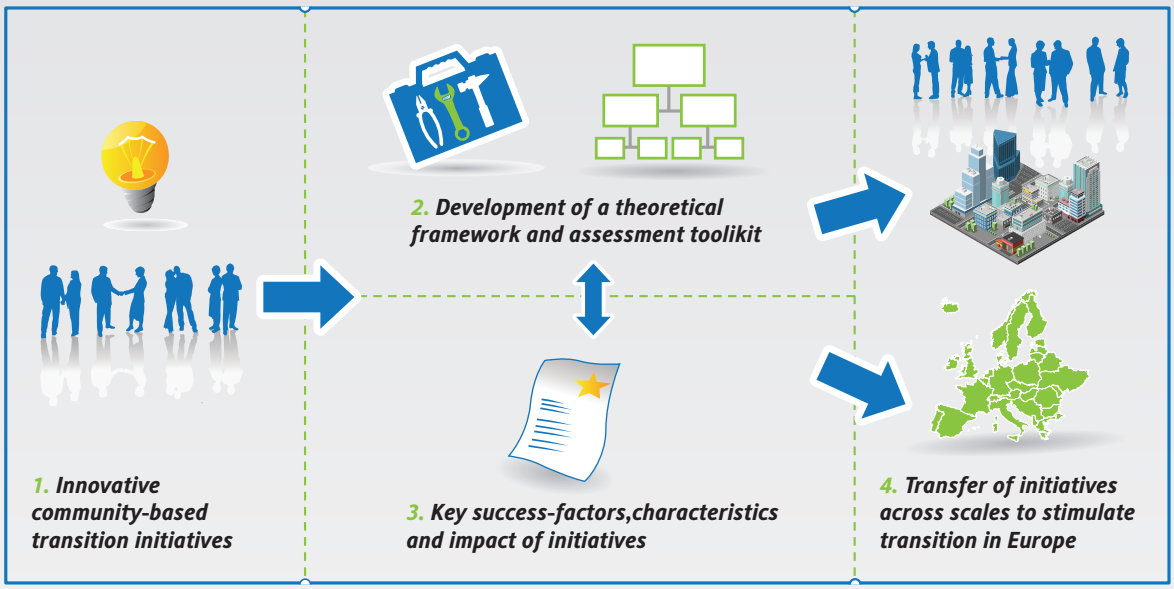

Figure 1. The overall concept of the TESS project and its potential impacts: from the identification of the CBIs (1), to the analysis of the CBIs (2 and 3), and the transfer of knowledge from this analysis to CBIs, policymakers, and their stakeholders (4).

At least as significant as the direct carbon savings that many of these initiatives are achieving are the wider environmental impacts, the awareness raising, the social cohesion, the creation of local livelihoods and retention of wealth in local economies and the feelings of empowerment that can come through working together to bring about change. TESS represents an effort to investigate these often invisible impacts, on the basis of a large set of case-studies located across Europe: in the cities of Berlin and Rome, the region Catalunya and CBIs located in the countries of Finland, Romania and Scotland. CBIs were identified through internet sources, from local knowledge and through snowball sampling by asking members of one group about other similar groups. To be included in our sample CBIs had to meet the following criteria:

- Initiated and managed by communities;
- May be non-profit or for profit but overall objectives should serve the community;
- Up and running for at least one year;
- Operate in one or more of four domains: food, transport, energy, waste.

CBIs engaged in sustainability activities were located in every sample region. They were found in both rural and urban areas, and across different political, social and geographical jurisdictions. The initial mapping of CBIs identified 320 eligible initiatives. In the second phase, a systematic yet also pragmatic selection process was undertaken by the research partners to select 14 'key' case studies, and 49 'supportive' case studies, ensuring representation of each of the chosen domains: food, transport energy, and waste. The key case studies participated in both the qualitative and quantitative data collection processes while the supportive case studies participated only in the quantitative assessment. This two-stage selection process yielded 63 CBIs willing and able to participate in the research. The data collected from these CBIs created a new and comprehensive database provides which served a basis to systematically assess the impacts of the CBIs as well as which contexts were the most supportive.

These 63 case studies (see Figure 2 below) served as a basis to achieve the following goals of the TESS project:

1. To assess the potential contribution of local and regional initiatives to achieve a sustainable, low- carbon society including multiple impacts (environmental, political, social, economical and technological) through a combined qualitative and quantitative assessment framework;
2. To fill the existing gap on Measuring, Reporting and Verification (MRV) of carbon reductions at the scale of community-based initiatives;
3. To identify particularly the factors leading to successful / unsuccessful initiatives and which therefore potentially establish movement towards greater wellbeing and a sustainable, low-carbon society, fostering prosperity and biodiversity protection;
4. To examine success factors for the emergence and up-scaling of successful initiatives, including those with novel concepts of sustainable management, and for the avoidance of rebound effects, and assess constraints and obstacles in regards to institutionalisation and up-scaling;
5. To estimate the potential impact of up-scaling initiatives based on scenario projections, and also investigate potential rebound effects and how these can be minimised;
6. To identify and investigate policy environments at different scales which are particularly conducive and supportive for initiatives seeking a transition to a sustainable, low-carbon society;
7. To provide a web portal for visualisation and comparison of the impact of European initiatives , to attract a range of stakeholders in policy, academia and project development, and stimulate public debate and action towards a low-carbon society;
8. To provide recommendations for transition strategies to policymakers by integrating and condensing research results into policy relevant knowledge. Thus, creating knowledge on down-scaling to provide policy infrastructures and architectures that can be readily turned into local or regional actions.

Through meeting these objectives, TESS has generated knowledge that will help foster a transition by creating a better understanding of the impacts and success factors of community-based initiatives. Such knowledge can help community-based initiatives improve their social and environmental impacts, and assist stakeholders in crafting policies that better support community-based initiatives. ■

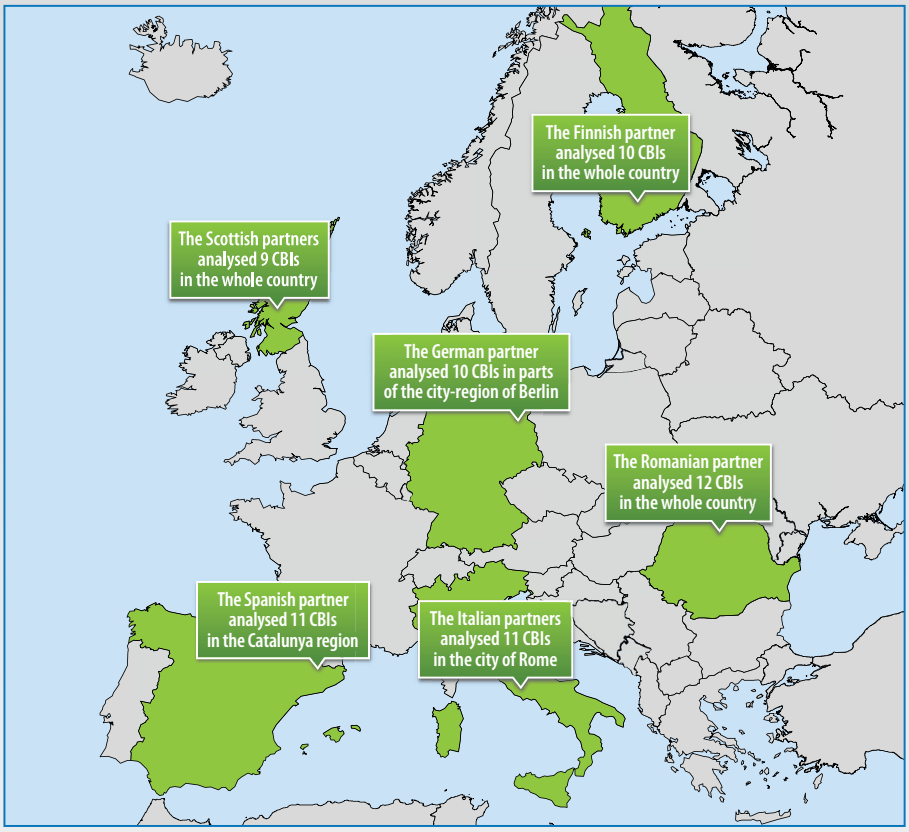

Figure 2. Countries in which the TESS project was conducted.

3. A description of the main S&T results/foregrounds

The TESS project can be broadly divided into three sections. Firstly, 63 community-based initiatives were selected as being the the empirical basis of the project. From the very beginning this process was performed by a systematic approach (cf. below). This allowed for the second phase of the project where the initiatives were quantitatively assessed to understand their carbon reduction potential and their contributions to their community's resilience. The initiatives were furthermore assessed in terms of their success factors to better understand their emergence, growth, survival and persistence. A multidimensional assessment was then conducted to gain further insights into their functioning and performance as well as their supportive or constraining policy environments. Lastly, findings from these tasks were disseminated through engagement with citizens, community-based initiatives, stakeholders, and policymakers. Two online tools invite CBIs to assess their achieved reduction in GHG and their resilience. ■

Publications from TESS

In terms of products, the systematic and comparative analysis of the CBIs produced a wealth of scientific evidence and reflections which will lead, over the next few months, to several publications with an high potential for having a relevant impact in the scientific debate, and in terms of policy-relevance.

8 ISI articles have been already published or are accepted, three more are currently under review. The final publication of the project will be organised as special issue (Regional Environmental Change/Springer has accepted the outline) and will comprise 9 papers. A second special issue highlighting the policy aspects of the TESS project (Environmental Innovation and Sustainability Transitions/Elsevier has accepted the outline) will contain also 9 papers.

Despite of these activities TESS accounted for more than 140 dissemination events/products.

Developing a working definition of a CBI

A definition of a community-based initiative in TESS was first constructed as a working definition within the project because there was no agreed definition of what constitutes a CBI available from the literature. It was decided to leave the definition rather open and inclusive, to generate a large population from which to sample for the smaller set that will answer TESS research questions. Thus, TESS´s community based initiatives are:

- initiated and managed by civil society actors/individuals;
- may or may not have received public money;
- may be not-for-profit as well as for-profit, but their overall objectives should serve the community;
- have been up and running for at least one year;
- can be located in a city, or in the countryside; the focus is on the initiatives and not on their spatial/ geographical location;
- operate within at least one of the following four domains: food, transport, energy, waste.

TESS´s application for case selection

In terms of case selection TESS was ground-breaking (1) in establishing a consistently common ground for case selection inside the project consortium; (2) in sampling CBIs from a snowball sample that does not rely on existing domains or networks and (3) in finalising case selection through an iterative, collaborative selection procedure. The case selection proceeded as follows:

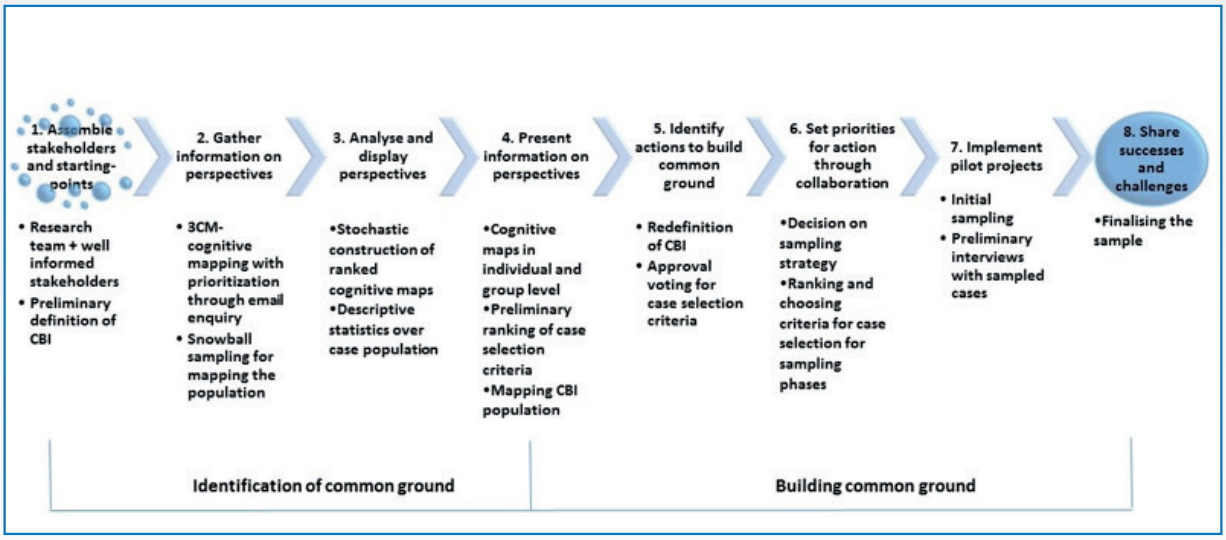

Figure 3. A process for identifying and building common ground for case selection. Names of the phases are borrowed from Lacroix et al (2016), content points describe the methodology applied in the TESS project.

To identify a "common ground" for case selection the email-inquiry concerning the TESS case study initiatives was constructed and sent to researchers of the consortium and to the closest stakeholders (phase 1 in Figure 3). The inquiry as a whole was aimed at improving the understanding of the criteria that partners consider important in selecting cases for the project, and to construct joint understanding of the definition of a CBI and motivation towards the initiatives within the consortium (phase 2 in Figure 3). Analysis of this "start-up" data applied integrated use of 3CM-cognitive mapping, simple multi attribute rating technique (SMART) and stochastic analysis of missing priority values. Figure 4 shows the ranked list of aspects that research partners and stakeholders raised as important to the case selection.

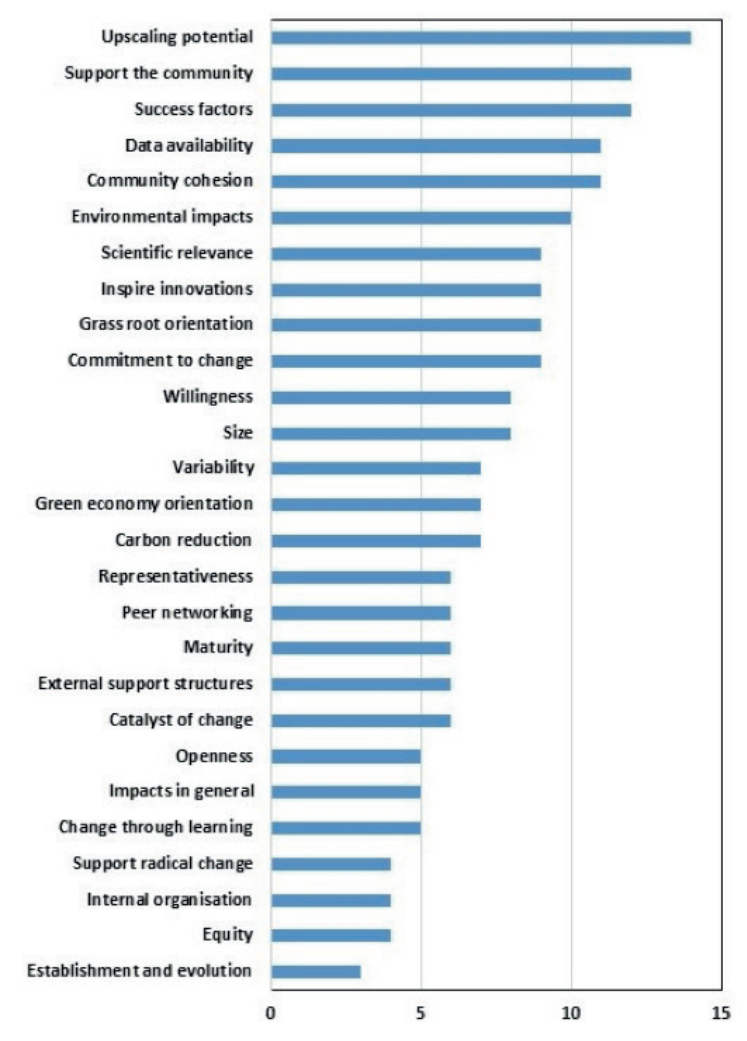

Figure 4. A list of criteria considered important to be taken into account in the case selection. Criteria and ranking are basing on the number of criteria in cognitive maps of project partners startup inquiry.

A snowball sampling procedure was conducted, starting with a preliminary list of a few initiatives (i.e. 3-10 for each domain). These initiatives were then contacted in order to (i) collect some tentative information and (ii) to indicate three similar initiatives (that they were aware of, as well as all similar initiatives they collaborate with). All the named initiatives were then contacted.

If they did not respond, or refused to answer the questions, they were excluded from TESS case study initiatives. This resulted in 618 initiatives. After the initiative database was established, all chosen cases were qualified in terms of suitability for TESS research interventions. The re-checking was run jointly in the consortium. This data set was then reduced to 266 cases, of which 219 gave their permission to publish some of their data publicly.

The collected database of TESS cases highlights the variety and multiplicity of community-based initiatives operating today across Europe. A CBI is difficult to define unambiguously, an important message for policymakers. What the analysis on regional characterisation(s) confirms is that CBIs are everywhere and operate for many reasons. CBIs emerge in varied environments ranging from urban to rural, also with large differences in population density. Within the case study selection stage it became apparent that local, contextual factors influence whether and how initiatives emerge and develop, yet another important message for policymakers. In order to objectively compare and analyse the selected case study initiatives, an analysis of the characteristics of the regions in which they operate was undertaken. Furthermore, each country, nationally, has different potential assets and barriers to the uptake of sustainable initiatives. The differences and special features of the case study regions and the countries where they operate was described to further this understanding. ■

Selection procedure of 49 supportive case studies

A stratified random sampling was then conducted from this population of 266 in order to select supportive cases for TESS. In the sampling, one stratum was decided to be the country. Eight initiatives from all partner countries were accepted for the sample, designating 49 supportive initiatives altogether. The other stratum was the domain, and in this case, the selected initiatives were divided evenly between the four TESS domains. In addition, it was decided that there should be some required variation in terms of the most critical dimensions (size, duration and organisational structure). For each of these, two classes were checked after sampling (e.g., small and big, new and long-lasting), and at least one third of initiatives needed to be found from each class, otherwise a new sampling would have been carried out.

In a next step, all of the initiatives selected in the sample were approached and surveyed in more detail according to feasibility aspects. In the case of (i) limited data availability, (ii) refusal to participate further (when then understanding more about the requirements of the research intervention) or (iii) too identical initiatives, the CBIs were substituted. The substitution was conducted jointly by partners.

As can be seen from above, the selection of supportive cases aimed at fulfilling “a random sampling strategy”, taking into account representativeness and feasibility, which were seen as the most important aspects among the consortium. ■

Selection procedure of 14 key case studies

Initiatives to be targeted by in-depth data collection (named as key-initiatives) were selected by searching initiatives from the final sample that would best serve the project’s purpose. Selection criteria for this purposive sampling were constructed in a collaborative discussion process supported by relevant multi-criteria decision methods. The process resulted in the following criteria that were used in ranking the initiatives according to their suitability: community-based, value based, willingness to participate, duration, data availability and environmental impacts, size, carbon reduction potential and external relations/networking. ■

Evaluation of the methodology

Reflecting on the selection process, the consortium considered the overall approach as relevant and functional, and the methodology was seen as supporting the approach and the objectives of the project. Regarding particular methods, a simple cognitive mapping application was considered suitable to the task and it was also considered performing well. ■

The cognitive mapping with 3CM-approach especially worked well and enabled the useful conceptualization of the different starting-points, hopes and worries the consortium partners had about the project.

Through its systematic selection of key and supporting case studies, the TESS project emphasized the importance of case selection procedure (in case studies there is a common tendency to focus typically on the novel or "avant-garde" cases, and representativeness of chosen cases is often not considered properly enough). The selection procedure indicated how the case selection procedure is a fundamental phase of multi-discipline and multinational case study research, and should be realised cautiously, transparently and with participation. In the TESS project we developed a case selection approach and a methodology that enhances creation of common ground among the research consortium that helps to avoid the most typical pitfalls of a case study research. Similar multiphase case selection process can be applied to other studies focusing on the role of community based initiatives (e.g. in domains of food, energy, waste and transportation). Utilization of such formal collaborative group work and decision support methods raises different perspectives about the overall objectives and methodological needs of the research on joint discussion in the consortium, and thus forms a thorough basis for decision making along the selection of case studies. Similar kind of approach is particularly recommended, when consortium involves various nations, cultures, disciplines, partners and communities. ■

Data gathering on social, political, economic technological and environmental dimensions of CBIs

A core basis for the work within TESS was the development of a questionnaire and carrying out a survey among the 63 case studies for the monitoring and evaluation of the CBIs.

As a first step, through a literature review, it was assessed which existing studies already considered the main dimensions/effects of CBIs in the four domains of TESS (food, waste, transport and energy), which key variables were consequently worth considering, and how they should be assessed and measured. While much of this existing knowledge is based on individual case studies and rarely provides a systematic assessment of their actual effects, TESS has advanced the research further by defining a comparable set of indicators for the monitoring and evaluation of this large sample of selected initiatives. The conceptual foundations and practical questions furthered the aim to constitute the first widely discussed and harmonized assessment methodology for CBIs in Europe.

In a second step, these indicators were used as the basis for data collection for a comprehensive survey questionnaire (app. 130 questions) which aimed at gathering a wide range of qualitative and quantitative information on social, political, economic, technological, and environmental dimensions, including an assessment of ecosystem services and green infrastructure provided by the initiatives.

Finally, the questionnaires have been used as the basis for extensive interviews among the selected case studies, ranging in general from 1 to 4 hours per meeting, for a total of 212.5 hours of interviews (by July 23th, 2015) from the TESS partners. The subsequently developed database is considered a key asset of the TESS project and represents a solid source of comparable information for a large sample of CBIs across Europe. ■

To what extend can CBIs contribute to climate change mitigation?

For the TESS project, the impact of CBIs on greenhouse gas (GHG) emissions was considered their central environmental aspect, i.e. the potential of CBIs to reduce their GHG emissions. Yet, no widely accepted concept to measure multiple impacts had been developed for CBIs across a wide range of different activities, despite GHG accounting being well developed for other activities. Therefore the TESS project has further developed an existing GHG Protocol for project accounting (Greenhalgh et al. 2005). In particular, it was adjusted in order to tackle the varied situations of our cases by finding the balance between meeting the scientific requirements such as completeness and accuracy, and acknowledging time constraints and data scarcity of the CBIs.

The developed framework determines the emissions relative to a baseline scenario which describes the hypothetical emissions in the absence of the activity. As a result, the method does not provide the total emissions caused by a specific initiative, but rather an estimate of the avoided GHG emissions compared to a baseline scenario for each activity, accounting for an average person's consumption behaviour in each country. For example, if an initiative is engaged in the production of local, organic produce, the difference in GHG emissions that are emitted between organic and conventional agricultural production systems is calculated.

This approach has been applied to the 57 CBIs in the sample. This reduced number is due to the fact that some CBIs are have not yet carried out GHG relevant activities or have not reported sufficient data. Results are based on the total GHG reductions compared to the specific baseline scenario and on the total reductions expressed as a fraction of the beneficiary's carbon footprint. The latter indicator answers the question "to what extent is the average citizen's carbon footprint reduced if he or she were a beneficiary of a specific CBI"?

Based on these two indicators, the activities that show the highest GHG mitigation potential are initiatives engaged in the activities of heat and electricity generation, personal transport and provision of vegetarian or vegan meals (see Figure 5).

Although the emissions reduced in the energy domain vary depending on the specific heat and electricity mix of the countries considered, large overall reductions are observed across all of the initiatives engaged in these activities. For example, providing electricity from renewable energy sources can reduce the carbon footprint of the CBIs´ beneficiaries by a quarter.

By supporting more sustainable means of personal transport (e.g. cycling), high reductions per beneficiary are also possible (around 11%). Under current conditions, the use of electric vehicles powered through the national electricity-mix does not reduce GHG emissions in countries with a GHG-intensive electricity mix. However, this is expected to change as the share of renewable energies present in different countries' national mix increases in future. An increase in sustainable transport requires the provision of infrastructure, e.g. for cycling or for electrical vehicles, which may need further public support.

For the food domain TESS results suggest that what you eat is much more relevant than how it is produced: by consuming vegan and vegetarian meals, beneficiaries of the analysed CBIs can reduce their GHG footprint by around 7%. Also, the redistribution of still-edible food from supermarkets has a large relevance for climate mitigation. The potential of initiatives engaged in providing locally-produced organic food is far lower when compared to initiatives engaged in providing meals with fewer animal products. However, many CBIs often have other aims, such as building a community or reconnecting with nature within an urban environment, rather than climate change mitigation.

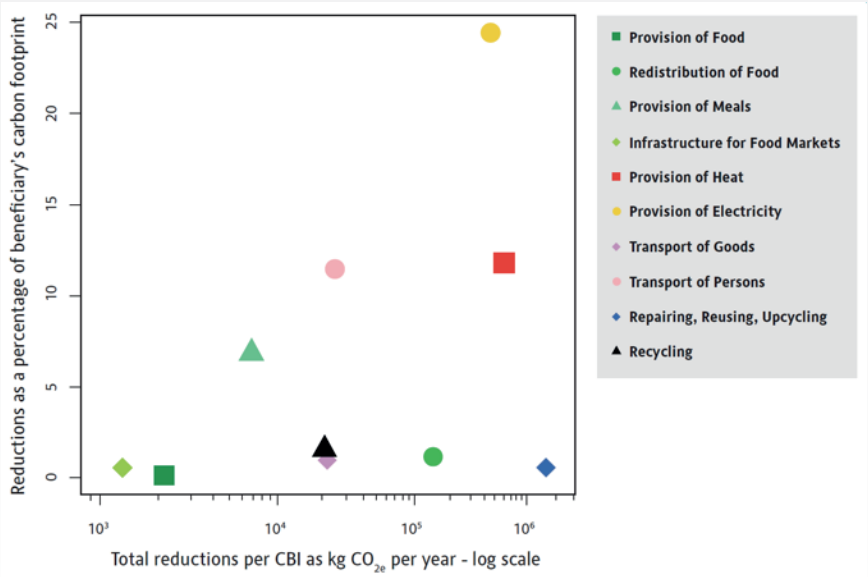

Figure 5. Absolute emissions reductions and reductions as a percentage of the beneficiaries' carbon footprint achieved through different activities of CBIs.

Although the GHG reductions achieved by the selected CBIs vary considerably across activities, overall the results show a large potential for climate change mitigation from this type of community-based initiatives. However, many of the quantified sustainability activities may incur in the so-called "rebound effects" from changes in beneficiaries' behaviour, which can have the potential to partially or totally offset the quantified emission reductions. However, this could not be quantified due to a lack of reported data.

The methodology to estimate the carbon reduction achieved by CBIs through different activities has been translated into an online tool named Track-It![1]. It gives CBIs the opportunity to assess their own impact, and then if they wish, to compare this with the average of the TESS case studies. By using the above described simple method that compares initiatives' activities against the average consumer behaviour, relatively little data is required to generate useful estimates of their impact. An example of the results provided by the tool is shown in Figure 6.

Track-It! also compares the emissions avoided by your initiative to the emissions avoided by TESS case studies carrying out the same activity.

The developed methodology to quantify the GHG reductions achieved by CBIs responds to the nature and necessities of the CBIs; based on the relatively low level of input data that these type of initiatives typically recorded. Although the GHG reductions achieved by the selected CBIs vary considerably across activities, overall the results show a large potential for climate change mitigation induced by this type of community-based initiatives. Also due to their diverse actions, many of which are beyond the activities included in the assessment of their GHG reductions (e.g. educational-related activities), a much larger indirect environmental impact can be expected.

If 5% of European citizens engaged as beneficiaries of CBIs similar to the ones sampled, almost 85% of the EU-28 countries would meet the target of reducing GHG emissions by 20% by 2020 (considering the food/agriculture, waste, energy and transport domains).

The developed methodology and derived results therefore for the first time are able to make the achievements CBIs for climate change mitigation visible across a large set of case studies and different activities. ■

Figure 6. Example of the results provided by the Track-It! Tool on the reduction of GHG emissions.

[1] http://www.sustainable-communities.eu/track-it/

Framework for assessing the wider impact of community-based initiatives through their resilience

The challenge of assessing and comparing the overall social, economic, political, carbon reduction and wider environmental impacts of highly diverse initiatives operating in very varied and different contexts, both within and between countries, has been met by considering these impacts in terms of their contribution to building community resilience.

An approach whereby community resilience can be understood as comprising four broad themes or dimensions (embracing people, economy, culture and cross-community links) has been used to generate four key indicators that have then been used to construct a simple 'compass of resilience' (based on Wilding, 2011). This provides an approach for understanding and comparing the performance of community initiatives as well as for understanding their future potential to support their community in responding creatively to future change and to create the fertile ground from which transformative systems' change to a zero-carbon future may become possible.

AValues for these key indicators were derived from the data collected through the questionnaire and survey described above, arranged according to the four points of this 'compass of resilience'. Included in the data sheet were a series of self-assessment questions that have also been grouped according to these four compass points, with an aggregate score for each point. This allowed a comparison between CBIs actual performance and their intentions and aspirations. All values were normalised by the size of the 'community of beneficiaries'; the local people that CBIs reported as receiving some benefit from their activities.

Plots of community resilience were created for all 63 case studies. This allowed an easy visual comparison to be made between highly diverse initiatives operating in very varied and different contexts, both within and between countries. These plots may be used to make an assessment of how successfully different initiatives are creating the resilience 'in the round' considered necessary to create conditions for transformational change. The results showed that some initiatives are very focussed on just one or two aspects of building resilience and their communities might become better prepared to engage creatively with unpredictable future challenges if CBIs reprioritise some activities to address currently neglected aspects.

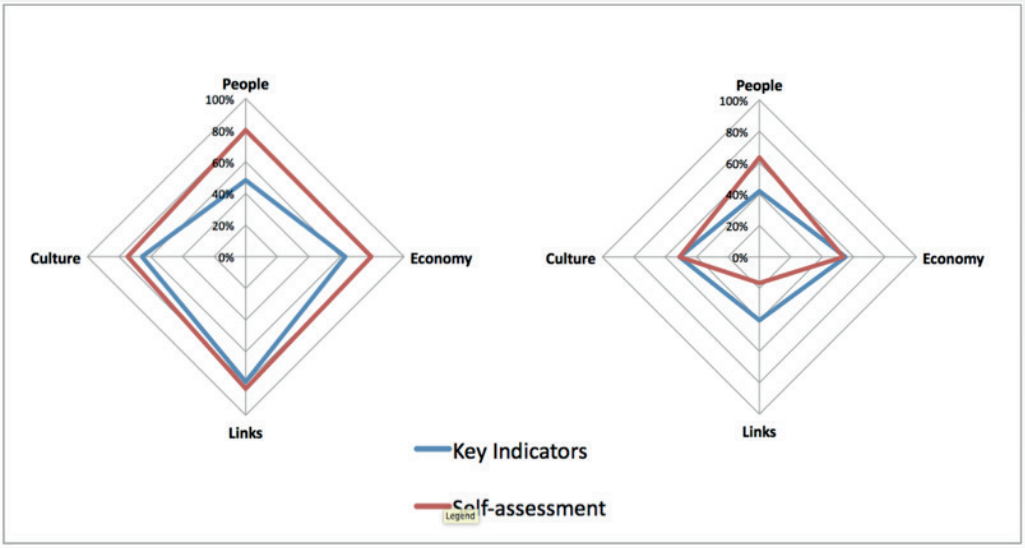

Figure 7. Community Impact of social enterprise that teaches re-use and repair skills, showing a well-rounded approach creating community resilience.

Figure 8. Community Impact of initiative supporting the to economic future of traditional farming communities suggesting that low attribution of importance to networking.

Limitations in the quality and availability of data, as well as the limitations of using any single quantitative indicator for any aspect of as complex a phenomenon as community resilience, mean that care needs to be taken in interpreting any compass of resilience plot. However, the 'compass of resilience' does seem to offer a useful approach both for comparing different CBIs and, in particular, for assessing the activity and impact of any particular CBI. It would seem especially useful as a tool for CBIs themselves to use to critically self-assess their current performance and how they should prioritise and focus effort so as to maximise their future impact. This concept has been further developed to create both an online tool, the **Resilience Compass**[2] that any CBIs can use for their own assessments and a design (and downloadable resources) for a facilitated workshop exploring community resilience. ■

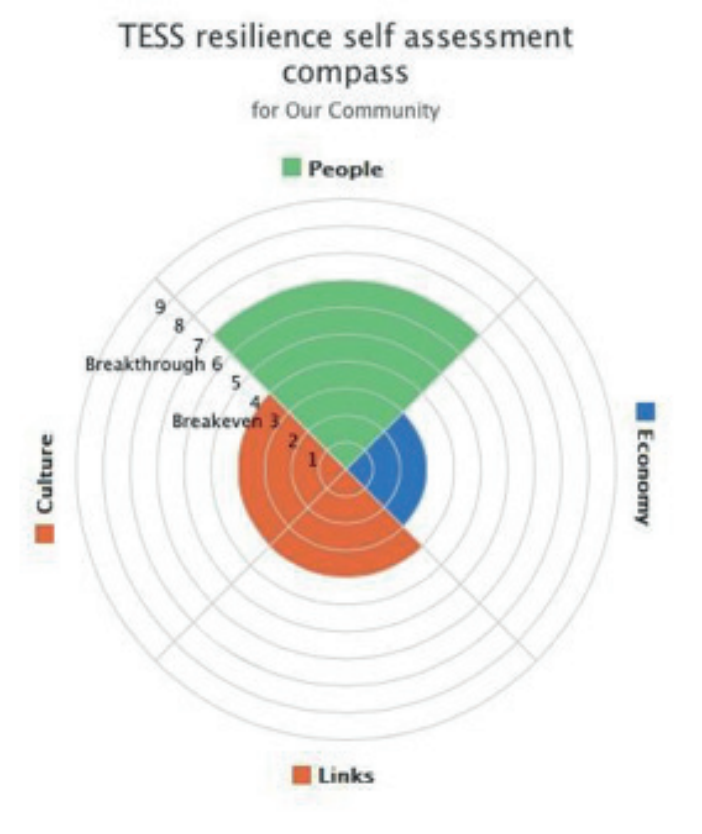

Figure 9. Example self-assessment plot from the Resilience Compass.

[2] http://www.sustainable-communities.eu/resilience-compass/

What factors support or constrain transition trajectories?

A key research focus of TESS was assessing the success of community-based initiatives throughout their trajectories, from their emergence and persistence to their growth and spin-off or replication, while evaluating the societal, social, attitudinal, and behavioural transformation involved. This included exploring the limiting factors and constraints for initiatives' persistence and growth, while paying a special interest to institutional arrangements and issues of inclusivity and equity within the CBIs. To this aim, between 5 and 6 members along with additional stakeholders of 14 initiatives from all project countries were interviewed using in-depth semi-structured questionnaires, resulting in the execution of 116 interviews which have been transcribed and coded over the length of the project.

The first finding which marks the outlook of the S&T results is the need for wider framing of "success" and of what a "key result" could consist of, especially in qualitative terms. The hyper diversity of CBIs' organizational structures, rationalities and approaches to sustainability makes comparability between cases extremely difficult, or pointing out key results challenging. In this regard, community-based initiatives might require a new and different language of assessment, or multiple different languages of valuation to be fully understood.

Second, the results of the semi-structured interviews show that to assess and understand the success of CBIs neither a single, nor a linear metric can be used. Rather multiple metrics and understandings of success were needed. Within TESS, success has thus been defined along one or more of the following (non-exhaustive) list of measures:

- CBIs emergence in correspondence to clearly articulated socio-environmental needs;
- CBIs continued existence, or survival, and hence their continued/increasing contribution to the socio-environmental needs within the community;
- CBIs growth and/or replication, hence expanding their impact with respect to the socio-environmental needs of society;
- CBI's use and dissemination of new technologies and business models;
- CBIs contribution to social/environmental justice.

Within these categories all CBIs are a "success" in terms of emerging, some are a "success" in terms of persisting, others in terms of growing, or replicating, and a few in terms of contributing to environmental justice (see Figure 10 below). Indeed, one of the most common responses to questions on CBIs' largest achievement was not quantitative (such as the number of members, level of income, or activities) but rather the very act of being there, of existing and resisting in a context of unfriendly socio-economic regime. ■

A new analytical framework for studying community-based initiatives

One of the immediate impacts of the analysis of success factors and constraints for transition trajectories concerns the development of new approaches to studying the impacts of community-based initiatives. In particular, a new analytical framework ('the fertile soil') explaining the emergence and evolution of community-based initiatives has been established. The fertile soil metaphor provides a useful framework for studying the success and constraints of community-based initiatives, perceiving them as living organisms with a diversity of rationalities and multiple tensions which act as creative forces for grassroots innovation. The framework can be considered a relevant contribution to the literature on community-based initiatives aiming at low-carbon transformation, while advancing science and contributing to overall research. Two academic papers, one theoretical and one empirical have been written to present and illustrate this new framework.

Figure 10. Factors influencing the emergence, persistence and survival of CBIs.

Starting with CBIs' emergence in response to the socio-environmental needs of a community, the factors that contribute to this type of success are multiple and mutually enforcing each other (see Figure 10 above). What TESS identified as new and key in this regard is the presence of a socio-political vacuum combined with a history of socio-political organizing on community level, as well as the emergence of bold aspirations associated with the need to embark on a profound societal transition or transformation. The role of public regulation and partnership with state-based institutions ranged from completely obstructing the process of emergence to acting as a powerful enabler, in function of the particular objectives that the groups had set themselves. Income-generation factors also have mixed roles in the process of emergence. For example, while in Scotland the financial crisis and the subsequent shrinking of state funding provided an important backdrop for CBIs' emergence, in other countries/cases it attracted more users and beneficiaries to grassroots organizing aiming to provide a response to the economic meltdown within the social and solidarity economy. ■

Factors influencing the survival and persistence of CBIs

Next, the survival and continued existence of CBIs partly depends on the particular moment and context of their emergence (see Figure 10 above). The measures of CBIs' success are thus interrelated. The establishment and persistence of community-based initiatives is also reliant upon a mixture of factors that also mutually enforce themselves. To list just a few, the existence of a diversity of rationalities and flexibility in terms of approaches has played an important role for survival. Combining this factor with the provision of space for members to diversify roles and pursue their own projects has been one of the pillars for CBIs' continued existence. Next, when CBIs' volunteers, employees or professionals establish a shared identity in the sense of belonging to a common cause, the initiatives tend to be more resilient to internal and external conflicts and dilemmas. Other factors are more ambiguous. The

role of having a constant source of income flows (or not), support on the level of the wider local community (or not), an established relationship with governmental institutions (or not) and engaging in political activism (or not), are all factors that enable, disable or have a neutral impact on the survival or persistence of community-based initiatives in function of their particular strategy and focus of activity. ■

Factors influencing the growth of CBIs

The growth of CBIs has been adopted in TESS as another measure of success. Nevertheless the majority of the CBIs are replicating rather than growing (63% of the sample). A common pattern emerging among the CBIs observed by TESS is that once they grow beyond certain mature scale in terms of services, economy or members, they tend to replicate or introduce structural changes. The strategy of growth is preferred when initiatives opt for higher professionalization and commercialization of their activities. The structural changes associated with growing often concern the introduction of certain level of organizational hierarchies which does not go without internal organizational tension. There are multiple manners by which groups deal with conflicts that accompany growth and established (internal) hierarchies. As the values that lead to the creation of a CBI tend to clash with the commitments needed for its growth, the evolution of grassroots initiatives that decide to up-scale requires mechanisms to monitor and tackle power imbalances establishing an open dialogue and spaces for feedback and reflection. Furthermore, while openness and participatory approaches contribute to growth in membership, these sometimes preclude generational continuity, which could be required for CBIs' survival. As with the case of persistence, income generation and state support can be central for initiatives aiming at professional/service- and membership- growth, while not particularly important for the groups using a replication strategy, especially in the field of energy. ■

Further success factors

In terms of defining success along the lines of introducing new technical and business models, innovation among the analyzed CBIs occurs in response to communities' needs and strategies, rather than as a goal in itself. In TESS we refer to "grassroots innovation", implying that CBIs own and embody sustainable practices, while generating socially embedded changes. Hereby, CBIs do not aim at introducing single innovations, but rather seek to translate their innovative efforts into a regime shift, emphasizing the associated social aspects. In practical terms, the innovative solutions in the field of transport are mostly associated with the promotion of carbon-neutral (bicycle) transportation in zones and settings which are not conventionally considered apt or easy. Some forms of car-sharing have also been promoted. In the field of energy, the key innovations are the introduction of low-carbon techniques for the removal of invasive weeds, the provision of heating by recycling wood chips derived from locally sourced wood, or the re-municipalization of the power grid in town facilitating a transition to a 100% sustainable energy. The promotion of new business models among the CBIs mostly takes the form of introducing cooperative models for organizing work, raising funds, delivering services or producing goods.

Finally, CBIs' ability to provide services and products in a socially equitable way is here defined as an important measure of success which is rarely considered in the literature. TESS results indicate that the small scale at which initiatives develop their work seems to limit their impacts to a relatively small group of people with similar interests and needs who share a common geography (generally middle class to wealthy neighborhoods). The unintended exclusivity features of some initiatives have prompted questions and concerns about their real impact on the broader society in terms of attaining a more just societal transition, which is not exclusively focused on carbon reduction. Importantly, even when CBIs put emphasis on their role in improving social and economic welfare, and highlight capacity-building and individual change as important achievements, they might not account for potential socio-economic and cultural inequalities that prevent certain more marginalized groups from accessing their activities or that prevent CBIs from reaching out to such groups. Overall results indicate that the CBIs located in multicultural neighborhoods and concerned with the struggles of marginalized groups have higher chances of enhancing social and environmental justice. When CBIs serve a wide range of social or ethnic groups their contribution to sustainability transition becomes applicable more extensively. Yet when resources are restricted, institutional and logistical

support is lacking and discourses remain within established cultural barriers (i.e too technical language) the variety of participants is not expected to be particularly high.

Overall, despite the hyper-diversity of organizational forms among the CBIs, the barriers to their success are oftentimes common and framed around the particular policy alignments and approaches to funding. Certainly the measures and factors of success described here are not exhaustive. They represent one interpretation, based on the scope and direction of the research, and type of initiatives interviewed. One conclusion in this respect is that CBIs' successes are not isolated from each other, or the achievements of one group are often a result of the successes or failures of other preceding or accompanying initiatives. This points again to the fact that their development follows not common trajectories, but is based on the importance of groups' capacity to learn from failures and deal with constraints and challenges by innovating and integrating multiple perspectives. ■

A multi-dimensional assessment of the performance of CBIs

A key aim of TESS was to go beyond the preliminary and at times anecdotal evidence about CBIs' functioning and impacts, in order to stress and to substantiate the need for a multi-dimensional and systematic assessment, and to conduct a comparative analysis across four domains of community organizing, six city-regions, and **several dimensions of CBIs' performance**: Carbon reduction (CBIs' contribution to the mitigation of climate change and global warming); Carbon efficiency (CBIs' ability to provide the best ways to reduce environmental impacts); Social capital (CBIs' capacity to provide occasions for socializing and meeting new people); Social inclusion (CBIs' ability to reach the most diverse group of beneficiaries and disadvantaged people); Political mobilization (CBIs' capacity to mobilise people towards a shared political goal); External networking (CBIs' propensity to build a network of CBIs and/or political, institutional or social actors); Financial sustainability (CBIs' ability develop a well-functioning business model); Local economic impact (CBIs' impacts on the local economy); Innovativeness (CBIs' potential to create/experiment new products/services and 'grassroots' innovation); Human capital (CBIs' ability to promote training, knowledge diffusion and improving skills). During this task, these dimensions of CBIs' impacts were analysed separately, in order to both provide scientifically relevant results regarding each of them, and to prepare for the following multi-dimensional assessment.

We found that the best performing CBIs have no prevalent sources of revenues but diversify their activities and funding sources. Their overall **financial sustainability** is also due to an extensive reliance on – mostly in-kind – contributions from members, including a large amount of volunteer labour. Nevertheless, they have the capacity to deliver a discrete amount of tangible **economic benefits**, create new paid jobs, as well as generate wealth and sustain local economic revitalization. CBIs, moreover seem capable of providing substantial benefits in terms of **human capital**, thanks to activities that are explicitly aimed at the diffusion of skills, and by providing informal venues for collaboration, knowledge diffusion and social interaction that bring the possibility of accessing high-expertise skill sets. Our research confirmed, moreover, how CBIs provide fertile grounds for nurturing not only social innovation, but also market-based forms of **innovation**. We assessed moreover the initiatives' propensity towards **external networking**: actors from intermediate network organizations and public bodies have the largest share of ties across all CBIs' networks. The most preferred and recurrent collaborations are, however, with other CBIs. The research also explored the CBIs' ability to promote **social capital**, by eliciting various forms of social investment from their members and seek out the development or strengthening of interpersonal relationships within their communities. A problematic issue is the extent to which CBIs promote **social inclusion**, ie. to reach a diversity of beneficiaries, including disadvantaged groups. The ability to CBIs to effectively promote **social justice**, economic alternatives and political change has been also investigated. Our research identified both continuities and discontinuities in this regard, and difficulties in providing open, participative and inclusive decision-making. In terms of environmental impacts, we estimated the aggregate impact of initiatives based on the potential future scenarios, and analysed potential rebound effects. We showed that this **aggregate impact** of CBIs is substantial and could even offer an important contribution to reach compelling environmental targets, if the number of participants to CBIs would reach certain thresholds. ■

Ranking and grouping CBIs based on their multi-dimensional performance

The TESS project has identified the 'best' CBIs or families of CBIs which, consequently, should be prioritized, supported, imitated and replicated. The set of **performance indicators** explored in the multi-dimensional assessment been refined and tested. We first performed a cluster analysis aimed at the identification of groups or typologies of initiatives based solely on their performance or impacts, i.e. disregarding their specific activities or characteristics. Five main groups emerged which are internally heterogeneous but have some common features in terms of basic characteristics, domain, and growth trends. Moreover, a comparative assessment of seven **categories of CBIs** has been performed. The results are presented in Figure 11, which includes only categories and criteria/indicators for which the results were sufficiently stable.

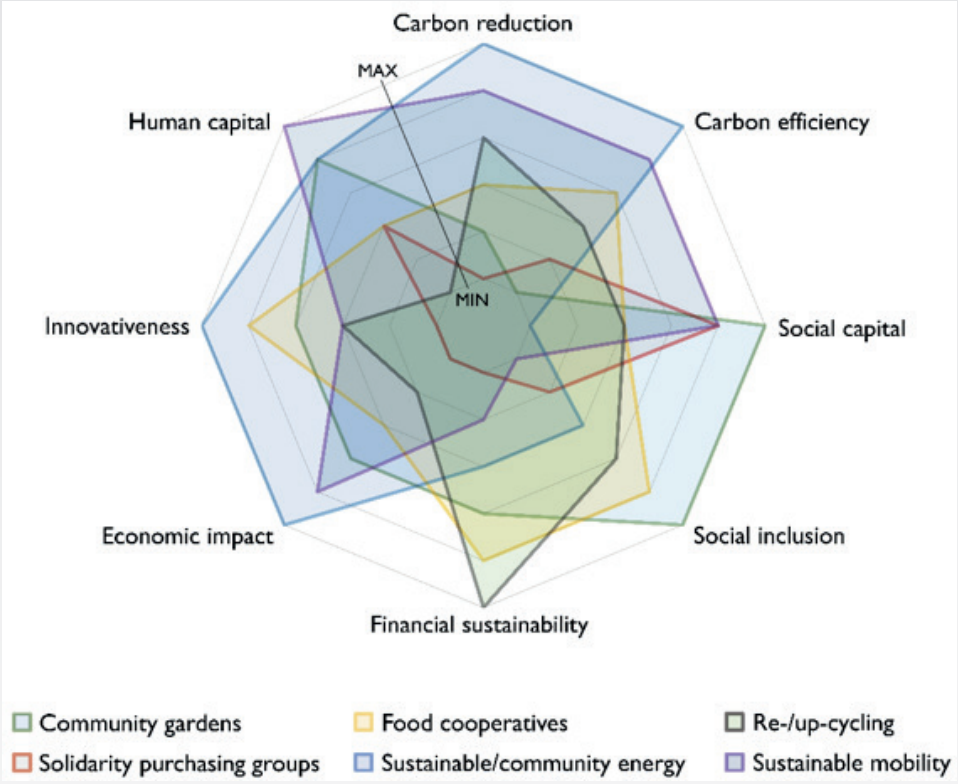

Figure 11. Relative performance of different types of community-based initiatives. Impacts have been averaged across all CBIs assigned to one type and ranked from 1st (best performance, "MAX" – e.g. high carbon reductions or strong financial sustainability) to 7th (worst performance, "MIN").

Finally, in order to comparatively assess individual initiatives, we opted for a **multi-criteria analysis** (MCA) based on the ELECTRE method (Roy 1991). In order to obtain a unique ranking, the ten criteria/indicators had to be weighted, based primarily on the values or preferences expressed by a panel of 25 stakeholders equally distributed according to their roles and areas of expertise. A sensitive analysis was conducted in order to verify that the influence of those weights does not compromise the solidity and stability of results. The results of the MCA, the cluster analysis described above and the whole TESS project, do not permit the easy extraction of more general findings, regardless of what groupings of CBIs are used in order to generate these findings – e.g. the domain, category of activity or the country of the CBI. The CBIs who rank among the best in terms of performance, in other words, are more or less evenly distributed among almost all domains and categories of CBI activities. Moreover, many of the 'top' initiatives are active in domains – such as that of solidarity purchasing groups – which were not the best performing when

considered in terms of average per category of CBIs. What this shows is that the specific activities CBIs conduct, their general characteristics, or the context in which they operate, is by far less relevant to overall performance than how this specific activity is conducted. However, we show that multi-activity CBIs, ie. diversification and exploration of a wide variety of community engagement, is an asset for the overall performance of CBIs. Additionally, in order to better understand why certain CBIs are capable of delivering substantial benefits to their communities, a closer look at each individual case is needed. Moreover, our results confirm that rendering visible the contribution of CBIs and properly stressing their societal and environmental relevance requires something more than a mono-dimensional and 'sectorial' perspective, which often characterizes both policy-making and scientific enquiry. What makes CBIs extraordinary – and particularly the 'best' CBIs – is their ability to act on each of the main driving forces behind a sustainable transition. ■

The first systematic and comparative analysis of community-based initiatives

The TESS project provided the first (to our knowledge) systematic and comparative analysis of community-based sustainability initiatives across four domains (food, energy, mobility, waste), seven sub-domains or categories of initiatives (community gardens, food cooperatives, community-supported agriculture, solidarity purchasing groups, re-/up-cycling, sustainable/community energy, sustainable mobility) and in six city-regions in Europe. It systematically compared and confronted, therefore, the internal functioning of CBIs and their basic characteristics, on the one hand, and their external impacts on the other, in terms of human capital externalities; local economic revitalization; social capital; social inclusion; political mobilization; external networking; social and grassroots innovation; aggregate environmental impact. This assessment permitted the further investigation of the critical factors behind the success and up-scaling of community initiatives, integrating results from earlier in the project. It integrated, moreover, the environmental analysis within a wider and multi-dimensional assessment framework, and in terms of aggregate impacts and potential rebound effects. The Multi-criteria analysis, in particular, permitted us to highlight the most relevant areas of impact of CBIs, according to external stakeholders and, based on this, to identify the 'best' community initiatives – as well as categories of initiatives - based on their performances and societal relevance. ■

A deeper understanding of societal transformations processes in the transition to sustainable, low-carbon societies

Another impact is the in-depth and multi-faceted understanding of societal transformations processes associated with the transition to sustainable, low-carbon societies, based on establishing multiple and interrelated measures of success and associated factors of success. Using this methodology allowed for standardized assessment of community-based initiatives, and hence for deepening academic understanding of the socio-economic and environmental impacts and potentials of bottom-up low-carbon transition. The key results of this analysis are furthermore being communicated to members of all CBIs involved in the projects, and hence resulting in a wider public debate on social innovation and bottom-up approaches to low-carbon transition. Series of individual meetings for face-to-face feedback are taking place in all six project countries. ■

CBIs and their policy environments: Enabling and constraining factors

Further, the most relevant policy environments were investigated which are particularly supportive for CBIs or, on the contrary, which act as barriers for initiatives' emergence, persistence, diffusion or up-scaling. These policy issues refer, on the one hand, to very practical difficulties grassroots initiatives face, such as accessing and controlling the assets needed to run the initiative; finding an appropriate legal status; accessing public funding; dealing with transparent, coherent and suitable regulations; and having a voice in local governance. On the other hand, investigating how these challenges are managed in practice has been useful for highlighting more general tensions between grassroots initiatives and public institutions, and how these tensions are negotiated within more or less favorable policy environments.

In terms of general findings, we found that although collaborating with **public institutions** and the 'political' dimen-

sion more generally is perceived by CBIs as their least important aim, relatively to other aims, CBIs' relationships with public bodies – especially local authorities - are on the overall frequent, intense, important. In terms of the contents of these relationships, the picture is more mixed, and problematic; 62% of CBIs reported some kind of constraint from public policies, in the form of regulations and laws that impose requirements in terms of organizational structure, legal status, volunteer labour; difficulties in accessing public funding; obstacles in accessing property, or assets, or imposed by planning regulations; or about a policy environment which is judged to be unsupportive in general, ambiguous or reluctant towards CBIs.

Based on this evidence, we identified eight '**policy environments**' to be investigated more in-depth, covering all the countries involved in the project, various domains of community engagement, and different policy-relevant issues: the assignment of abandoned buildings to social initiatives; the multi-level institutional framework in which alternative food networks operate; the promotion and disciplining of community gardens; how applying for and maintaining a legal form implies several requirements and adaptations; the role CBIs play in reconnecting citizens to their local resources and sustaining local democratic governance; the difficulties many community initiatives face in order to access public funding; how environmental and innovation policies impact community energy organizations; and how policies on the prevention and recycling of waste affect community organizing in this domain. ■

Online initiatives

Based upon the methodologies developed for the multidimensional and the success factors analysis, TESS also developed a preliminary investigation about how new communication technologies can lead to the development of different kinds of community-based initiatives, how these initiatives can be assessed and whether they present significant differences with respect to the more traditional, face-to-face ones. When compared to the overall TESS research, the extent of this investigation was much more limited and presents the beginning of a potential future research path looking at the interdependencies between online and offline community-based activities. The descriptive analysis of two case studies allowed to present some first findings and observations about **difference and similarities** between online and offline initiatives and about online initiatives main features. ■

Policy recommendations

Based on the results of the TESS project we extracted policy-relevant information, recommendations and guidelines for policy-makers. The main **policy recommendations** which emerged from the research are: the need to ensure long-term predictable policies; to improve information, transparency, accountability in policy-making; the need to simplify procedures and bureaucracy; to harmonize laws and regulations; to ensure coherence in the implementation of policies; the proposal to establish or to improve a permanent dialogue between CBIs and public authorities; to remove barriers many CBIs face in their access to public funding; to improve CBIs' access to assets and space; to increase training information and knowledge for and around CBIs; to 'invert the mindset', ie. to acknowledge the role of CBIs as a source of political empowerment, rather than as something that needs public support or top down encouragement. Some of these policy recommendations regard general policy issues which turned out to be, however, particularly problematic for CBIs, and were discussed in terms of the specific problems they pose for community organizations in the six city-regions explored throughout the project, referring to several examples of 'best' and 'worst' practices. ■

Better understanding of the socio-economic and environmental impact of transition

TESS provides the relevant tools to understand the socio-economic and environmental impact of CBIs with the assessment data sheet, the multi-criteria evaluation and the developed online tools. These tools allow a quantitative and qualitative assessment in terms of direct and indirect benefits they offer for groups' economic and societal impact in regards to resource saving, job-creation, wellbeing and - importantly - environmental impact (i.e. carbon emissions, biodiversity, ecosystem services, and environmental quality). The report on the impact of community-based initiatives on the transition to sustainable, low-carbon societies integrates and summarizes the findings for the investigated initiatives, thus summarising feasible achievements across the gradient of EU conditions. ■

4. The potential impact (including the socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results

General Impact of the TESS project

The TESS project addressed the main objective of the FP7 Environment 2013 theme "Transformative and Responsible Innovation" which promoted "sustainable management of the natural and human environment and its resources by advancing our knowledge [...] and developing new technologies, tools and services, in order to address in an integrated way global environmental issues". In line with this, TESS addressed in particular the elements of "improving resource efficiency within and across all sectors of our society [...] to reduce our societal ecological footprint and to preserve our fragile environment and its ecosystems services" and "create a new European economy with strong global competitive advantage by 2020". It is the central achievement of the TESS project that it developed a standardised and transferable impact and efficiency assessment of community-based sustainability transition initiatives.

In particular, TESS developed a systematic and comparable data base of 63 CBIs across Europe. This novel and extensive information source provided the basis for a carbon accounting framework at the community scale and the basis to learn from success factors and barriers of numerous existing initiatives. The societal transition is a major concern for policymakers and regional planners. Taking into account the slow progress in climate mitigation at the international level, a standardised impact assessment of community-based initiatives and their success factors, as realised in TESS, makes it possible to identify hot spots for today´s and future action. This in particular supports European Cohesion Policy, because it will allow a spill-over and transfer of innovative actions for carbon reduction and sustainability. TESS addressed the need for information on successful and innovative approaches for carbon reduction and environmental sustainability by:

- Advancing science through a context-specific, empirical, integrated and interdisciplinary approach;
- Providing a knowledge basis for European policies related to EU's Sustainable Development and Biodiversity Strategies, the 'Climate and Energy package (20/20/20 targets)' and the Roadmap for moving to a competitive low-carbon economy in 2050;
- Providing innovative tools to stakeholders at appropriate levels in EU member states and beyond;
- Producing knowledge that supports the EU as well as international institutions such as the UNFCCC to meet challenging emissions reduction goals.

In particular, the call ENV.2013.6.2-3 Transition to sustainable, low-carbon societies demanded as a major output increased knowledge on the values, policies and mechanisms behind societal transformation towards sustainable, resource-efficient, low-carbon and climate resilient European societies. In this context, opportunities for innovation (including social innovation), co-benefits and job creation should have been identified and studied to help the private sector, households, communities, local and regional governments respond and adapt to global environmental changes and support the development of green economic strategies in Europe. Before the start of the TESS project, assessments of impacts and success factors of social innovation were limited in that they were often neither comparable nor transferable. Achieving comparable assessments (through for example a carbon accounting mechanism) across different initiatives was a central focus of TESS.

The various activities conducted over the course of the project have potential impacts including:

- The development of innovative and systematic case selection procedures that can be used in future research projects, particularly those with diverse countries, cultures, and disciplines are involved;
- Characterising the regions and countries where community-based initiatives arise;
- Highlighting the vast diversity that exists among community-based initiatives;
- A scoreboard that can be used to understand the impact of community-based initiatives on reducing GHG emissions and their resilience;
- The development of the fertile soil theory, a new analytical framework for studying community-based initiatives;
- A deeper understanding of societal transformation processes and the success factors that can enable them;
- Scientific publications that report on the advancement of the state-of-the-art and which have the potential to impact future research (overall 8 ISI publications have been published or are accepted, while 18 others are planned in two special issues of ISI journals) ;
- The first systematic and comparative analysis of community-based initiatives, integrating environmental impacts and success factors, to create a wider multi-dimensional assessment of community-based initiatives;
- Potentially impact on policy through investigating the impact of several areas of policy on community-based initiatives and providing suggestions to policy-makers through policy briefs;
- Strengthen the work and resilience of CBIs by producing, using and disseminating the results from the Track-It![3] GHG accounting tool and the Resilience Compass[4];
- Make the impact of CBIs more known to policy makers at local, regional and European level, to the general public and to CBIs themselves.

These potential impacts will be further discussed in more detail in the following sections. ■

Stimulation of public debate on social innovation and bottom-up approaches.

The strategy for stimulation of the public debate taken by TESS was based on multiple measures. While there is growing recognition of the role and potential impact of community-led transitions towards sustainability, there is still something of a divide between those who see themselves as putting sustainability principles into practice, and those who study the effects of this activity. This is beginning to be bridged by the formation of practitioner-researcher networks (such as the Sustainable Transitions Research Network).

There is more work to be done to engage community practitioners in both establishing the research agenda on community-led sustainability, and providing results in ways that enhance community-led practice. There are also a number of different stakeholder groups within community practitioners themselves (e.g. between social, environmental and innovation priorities) making it difficult to engage with this group as a whole.

The heterogeneity of community practitioners presents challenges for researchers and academics in stakeholder engagement. Exchange between **community activists** (e.g. from our case studies), involving also **academics** researching on societal transition (e.g. STRN network) took place in face-to-face settings, through published materials and online.

[3] http://www.sustainable-communities.eu/track-it/
[4] http://www.sustainable-communities.eu/resilience-compass/

Existing networks were supplied with tailored information and the public debate was stimulated through supporting Small and Medium-Sized Enterprises **SMEs** and innovative types of cooperatives. For instance, our interactive platform provides the two online tools, the Resilience Compass and the Track-It! GHG accounting tool to be widely used. **Public dissemination** on community-based initiatives and the TESS results took place through the two videos, TESS and Facebook groups as well as the sustainable-communities.eu platform and the booklet "Community Climate Action across Europe - 62 Portraits from six countries". ■

Figure 12. Title page of TESS booklet Community Climate Action across Europe - 62 Portraits from six countries (available at:www.tess-transition.eu/).

Bridging the research-activist-policy divide.

The TESS project developed an interactive online platform (www.sustainable-communities.eu) delivering information in multiple formats and linking into other social media channels such as Facebook, Twitter, YouTube and the TESS official project website (www.tess-transitions.eu).

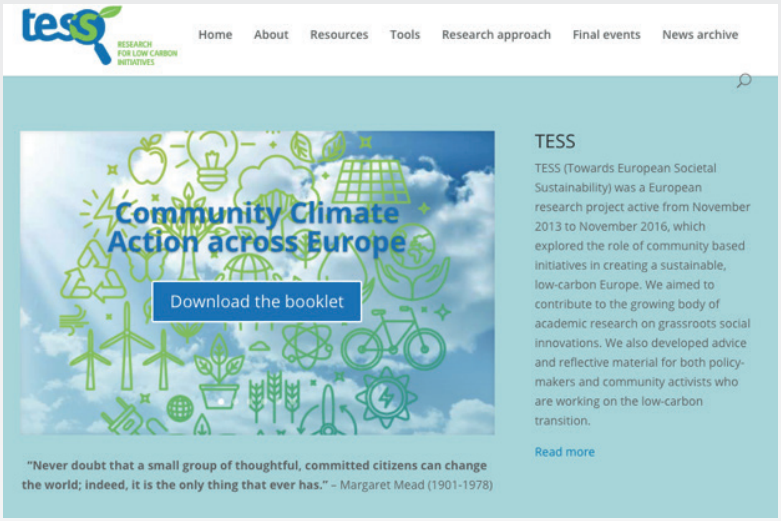

Figure 13. Screenshot from TESS project website www.tess-transition.eu/ .

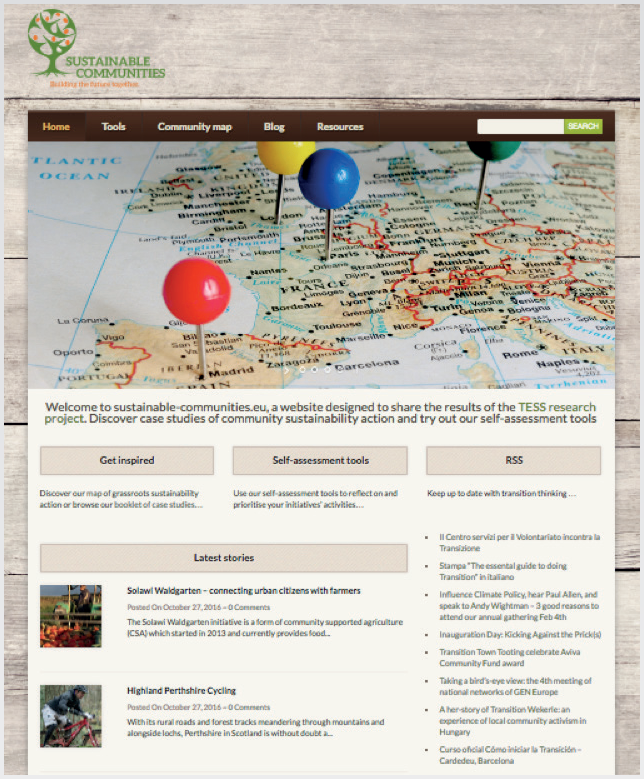

Figure 14. Screenshot from Interactive online platform www.sustainable-communities.eu.

Figure 15. Screenshot from Twitter.

By designing the interactive platform in a different way than the project website, it makes content available to multiple audiences, including community activists and policy makers, thereby bridging the research-policy-practice divide that so often characterises research on/with community groups. Content included a map of community-based initiatives in the six case-study regions and further regular content was delivered through blog posts on the 63 case studies included in TESS. These blog posts were written by researchers in TESS not as academic accounts, but more personal reflections and descriptions of the community projects who participated in the TESS research. The idea was to provide an insight into the feelings and sometimes challenges of community-led sustainability and to link initiatives which at first sight may appear to be very different. ■

Providing assessment and training materials for CBIs and policy makers

The platform provided a home for the two online self-assessment tools, three Information Sheets and other supporting material. The **Resilience Compass** encourages communities to think about how they cope with change, provides a reflective exercise to assess how they are doing and a comparison with the TESS case studies as a guide. This is supported through an **information sheet, a tutorial video and a package with material for workshops**. The second self-assessment tool is the **Track-It! GHG calculator enables CBIs** to estimate the carbon reduction achieved through different activities. It is also supported through an **information sheet and a tutorial video**. Assessment and reflection helps CBIs and policy makers to better understand the impacts of their decisions and to target their actions according to priorities. Both self-assessment tools are a lasting output of the TESS project and will remain available online for at least three years after the project has finished. ■

Provision of assessment of options and experiences to policymakers for improved decision making.

Evaluation criteria and standardised assessments created by TESS allow political decision-makers at various scales to evaluate transition pathways and integrate them in political strategies and programmes TESS's findings have **clear implications for policy development** by 1) providing a framework for assessment of initiatives in terms of social, economic and environmental impacts, 2) helping to identify the processes contributing to the up-scaling of community-based initiatives from locally based projects to wider societal transformations, and 3) investigating the social, economic, political and cultural barriers to take-up of initiatives across multiple scales and sectors. ■

Potential impact on policy at various spatial levels.

The TESS project identified, discussed and investigated several areas of policy which both enable and disable CBIs, through an analysis of the CBIs' general perceptions and the in-depth investigation of eight specific policy environments. This permitted us to extract and to disseminate **policy recommendations and policy guidelines** which, on one hand, stress the relevance of CBIs for a societal transition and, on the other hand, propose several policy improvements which could substantially empower CBIs and their contribution to a societal transition in the European Union and beyond. The TESS project **identified which specific community initiatives deserve more attention**: which should be highlighted, further explored, prioritized, as well as replicated in other contexts or up-scaled. Moreover, TESS identified which CBIs should be supported through an appropriate mix of top-down support, bottom-up empowerment, and horizontal confrontation with other CBIs.

TESS extracted and disseminated policy-relevant knowledge from the project findings in a comprehensive, clear and concise form. Four **policy briefs** were developed, to provide a synthesis of the main findings regarding the process of data collection, analysis and overall research work undertaken within TESS. The first policy brief presents the **potential of CBIs to mitigate climate change**. The second brief focuses on the particular type of innovation CBIs promote: **grassroots innovation and social innovation**. The third brief covers the **multiple definitions of CBIs' success, from reducing GHG emissions to CBIs' up-scaling potential and their contribution to environmental justice**. The fourth brief reflects on the **overall lessons learnt within the project regarding the key impacts** of the studied initiatives.

The briefs restate the potential of CBIs to drive a transition to low-carbon Europe, while stressing the role of establishing favorable policy regimes, where access to land and space for community-initiatives is facilitated. A key impact of the research on success factors is its **contribution to widening policy-makers' perspective and understanding of community-based forms of organizing, and of their diverse logics and multiple strategies towards sustainability**, which will hopefully be reflected in decision-making at a large stage.

In addition three joint policy briefs from the ARTS, PATHWAYS and TESS project were published and are covering the areas which have been identified as common in transition research:

- Beyond upscaling? Multiple pathways to accelerate sustainability transitions;
- Tracing impact and showcasing success of transition initiatives;
- Role of science in sustainability transitions.

Partners of all three projects hope that the messages to policy makers elucidate the complexity of low-carbon transitions and provide ground for policy action and practice for sustainability. ■

Contributions to European policies

In addition to the previous chapter, TESS particularly contributed to the following aspects of European and national policy programmes and initiatives:

Objectives of Europe 2020 with a "determined focus on fostering new ideas, supporting world class teams tackling significant societal challenges" (European Commission C, 2012).

The aim of the Europe 2020 strategy for smart, sustainable and inclusive growth (European Commission C, 2012) was embedded in the core idea of the TESS project regarding **the identification and evaluation of innovative community-based initiatives** for a sustainable, low-carbon society. TESS explicitly addressed targets concerning climate change and energy sustainability for example through the MRV framework at initiative scale. Several principles of TESS aimed at bringing together different levels of decision-making, the reality of SMEs as well as research. This helped in efficiently addressing cross-cutting issues and reducing the fragmentation of information. ■

Strengthening the European Research Area (ERA).

The TESS project supported the core goal of the ERA of a European-wide open space for knowledge by providing **accessibility of project results and transparency of the applied methods**. The information and developed tools were made available to the public and scientific community through the TESS website and the TESS interactive platform. Scientific publications were and will be published in open access journals where possible. An exchange and coordination with other projects financed under the same call, as well as in similar calls took place.

Contribution to the implementation of "The Eco-innovation Action Plan"[5] with the goal to reduce pressures on the environment through innovation and market access.

TESS generated information on the reduction of environmental pressures through community-based initiatives while **assessing the main factors for successful initiatives**. TESS research indicates that CBIs cultivate both social and, almost two thirds of CBIs, also market-based forms of innovation. More specifically, 38% of the surveyed initiatives are engaged in the formation of new markets by creating new goods or services which were previously unavailable. Thus, initiatives often provide a natural link between innovative ideas for sustainability and markets, as for example observed in the market for organic food. Understanding and dissemination was further supported through the close collaboration of academia and SMEs in the TESS consortium and a range of innovative media-formats to disseminate results.

In addition TESS explicitly addressed the transition to a more sustainable, resource efficient society by **systematically investigating innovative measures** on the demand side. TESS contributed to promoting and facilitating knowledge transfer, assessment, uptake and exploitation of research and innovation data and results, e.g. with the sharing of best practice examples, the online assessment tools, the videos, the training manuals, the policy briefs, etc. In this way, TESS contributed to the knowledge necessary for initiative scale-up and replication in view of the new Smart Cities and Communities European Innovation Partnership.

The high relevance of the participation of SMEs within the consortium to tackle environmental problems, as recognised by collaboration within the work programme and by the European Parliament (Edie newsroom, 2013), was reflected in TESS. Two SMEs contributed to the project and benefitted from the involvement in TESS through the development and application of new tools for creating services for a transition to a sustainable, low-carbon society. ■

Main dissemination activities and exploitation of results

The TESS project focused on community-based initiatives and their impacts and success factors and as such through the project's many dissemination, communication and engagement activities raised awareness of community-based initiatives and their potentialities. This may help both the various stakeholders and community-based initiatives themselves to realize the possibilities of community-based initiatives in contributing to a transition to a more sustainable society. A dedicated update of the TESS project website and the sustainable-communities.eu platform at the end of the project, describing the various project outputs for the various target groups should support the exploitation of results also after the end of the project. The chart below offers an overview of the dissemination activities conducted over the course of the TESS project as well as the level of the activity and target group:

[5] http://ec.europa.eu/environment/ecoap/

Dissemination activity, tool or material	Level of activity	Target groups
Online:		
TESS website www.tess-transition.eu European	European	Researchers, policy makers, CBIs, EC, general public, Media
Interactive platform www.sustainable-communities.eu, including a map of the TESS mapped CBIs	European	CBIs, EC
Track-It! Tool on GHG accounting	Local/regional	CBIs, activists, policy makers
Resilience Compass	Local/regional	CBIs, activists, policy makers
TESS e-newsletter	European	Researchers, CBIs, EC
Blog posts on TESS CBIs	European	CBIs, general public, activists
TESS Tweets	European	CBIs, activists, researchers
TESS Facebook group	European	CBIs, activists, general public
TESS YouTube channel with:		
TESS video on project introduction	European	CBIs, activists, policy makers, EC, other-stakeholders, general public
TESS video on results "The diverse impacts of community-based initiatives"	European	CBIs, activists, policy makers, EC, other stakeholders. general public
Training tutorial videos	Local	CBIs, activists
TESS talks	European	CBIs, activists, policy makers, EC, other stakeholders. general public
On- and offline:		
TESS Policy briefs: • Success Factors of Community-based Sustainability Initiatives • Innovation Potential of Community-Based Sustainability Initiatives • Potential of Community-based Sustainability Initiatives to Mitigate Climate Change • TESS Main Lessons Learned: A Summary of Results and Reflections	Local/regional, European	Policymakers
Information Sheets: • Challenges and Success Factors • TESS Resilience Compass • Track-It! Tool	Local/regional, European	CBIs, activists, other stakeholders

Dissemination activity, tool or material	Level of activity	Target groups
TESS-ARTS-PATHWAYS joint policy briefs: ● Beyond upscaling? Multiple pathways to accelerate sustainability transitions ● Tracing impact and showcasing success of transition initiatives ● Role of science in sustainability transitions	European	EC
TESS booklet "Community Climate Action across Europe - 62 Portraits from six countries"	Local/regional, European	CBIs, activists, policy makers, EC, other stakeholders. general public
Project leaflet	European	Researchers, EC, other stakeholders
Posters	European and international	Researchers
Scientific publications	European and international	Researchers
Articles and communication with the media	Local/regional	General public, media
TESS factsheet	European	EC
Factsheet for TESS CBIs, translated into local languages	Local	CBIs
TESS special issue "Community organizing, sustainability transitions and public policies" (accepted, in preparation), Journal Environmental Innovation and Societal Transitions	European and international	Researchers
TESS special issue "Sustainability transitions to low carbon societies: insights from European community-based initiatives" (accepted, in preparation), journal: Regional Environmental Change	European and international	Researchers
Events/networking:		
TESS (un)conference in June 2015	Scotland, European	CBIs, activists, Researchers, other stakeholders
TESS-ARTS-PATHWAYS final symposium "Sustainability transitions towards low-carbon societies" in October 2016	European	Researchers
Session "Cities as actors of open innovation: Accelerating Transition towards Sustainable and Low-carbon Societies" during the 14th European Week of Regions and Cities in October 2016	European	Policy-makers, EC
Participation in working groups or network meetings	European and international	Researchers
Dissemination events at local level (including face-to-face meetings / interviews with CBIs)	Local	CBIs, activists, local policy makers, other stakeholders
Attendance at Climate-KIC PhD summer school	European	Research students, local policy makers, researchers

Table 1. Dissemination activities conducted over the course of the TESS project.

In more detail the most important areas of dissemination were:

Engaging community-based initiatives and activists and encouraging dialogue and debate

The TESS project was also concerned with engaging stakeholders through encouraging dialogue and public debate as well as with the CBIs that were involved in the research. This was done through face-to-face meetings, partner networks (e.g. Scottish Communities Climate Action Network), local events, social media channels such as Twitter and Facebook and the interactive platform. TESS researchers attended and presented at a number of conferences, seminars, summer schools and workshops. The **TESS mid-term (un)conference** brought together over 80 delegates to discuss community transition and provided a number of outputs in the form of video interviews with speakers, which were posted online. In addition to the more traditional face-to-face engagement, we also extensively used social media, especially the medium of Twitter, where we were able to attract the attention of the stakeholder community as well as academics. ■

Informing the general public

Community-based sustainability initiatives are based on the participation of citizens involved towards a shared objective: the promotion of a low-carbon and sustainable society. Many people are participating in or benefitting from them, however, citizens do not have the tools to understand and evaluate the real impact of these initiatives, either at personal, community or higher level. TESS therefore **offered the general public information about community-based initiatives and their impact**, and more in general about research projects furthering transition towards a sustainable society through a number of activities and tools (two videos, project website, twitter feeds, Facebook group, e-newsletters, leaflet, booklet). ■

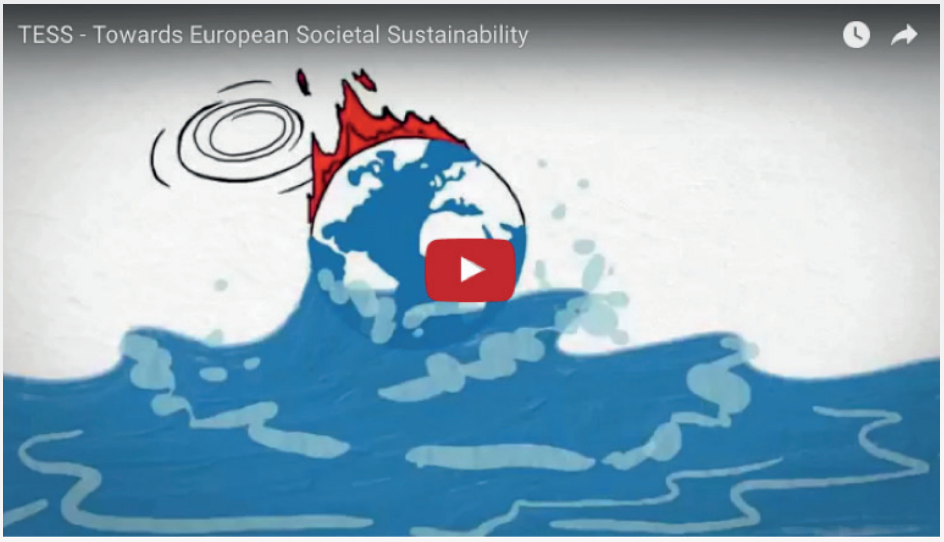

Figure 16. The title screen of the first TESS video (https://www.youtube.com/watch?v=lE8fK_wppCA).

Figure 17. The title screen of the second TESS video (https://www.youtube.com/watch?v=9dToTIMXpH4).

High visibility in the scientific community

TESS produced **cutting-edge research** in the fields of carbon accounting, sustainability transitions, community-based initiatives, local development and community empowerment. In order to share the project's scientific results with the rest of the scientific community and participate in the current general debate on these issues, it started to widely **disseminate all its findings in the scientific community** and will continue to do so after the end of the project, both through academic publications and presentations at conferences of national and international academic networks.

In terms of **publications** developed and submitted in academic journals, a full list can be found in other parts of this report. For example the qualitative analysis of the success factors resulted in the preparation of the following list of papers: Cycling initiatives and policies across EU; Community-led initiatives' everyday politics for sustainability; The neoliberal legacy: An analysis of imaginaries of change and embedded rationalities in community economies; Energy initiatives and socio-political change; Politics via food and bikes; Hierarchy, Communication, and the Suppression of Innovations within Community-Based Initiatives; Relationship with money within community-based initiatives working towards sustainability.

TESS was e.g. actively involved in **networking** with other EU funded research projects on related topics (ARTS, GLAMURS and PATHWAYS) and with practitioner networks (Transition Research Network and ECOLISE). Another example was the final common event of ARTS, PATHWAYS and TESS researchers in October 2016 in Rotterdam.

Dissemination to policy makers

Political actors represent a key target in the effort to support the transition to low-carbon and sustainable societies through wide dissemination the project's findings. The project provided an outstanding opportunity for advocacy for the EU environment agenda towards policy-makers at the local, national and European level. Communication focused on elaboration of research results through utilising materials and formats **specifically targeted to policy makers** (e.g. four policy briefs, a scientific report on policy analysis and recommendations), in order to provide them with explicit and highly relevant information and guidance about the content, the contextual constraints and the opportunities and expected impacts of community-based innovation initiatives (see impact on policies above).

The following Figure 18 summarises the specific outputs for the various target groups.

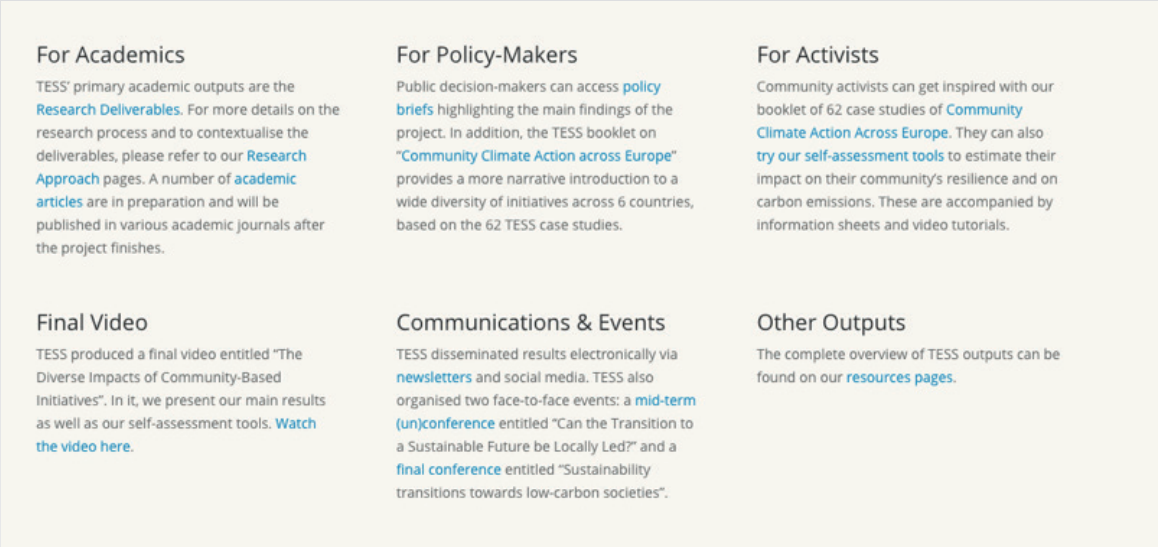

Figure 18. TESS outputs divided to target audiences.

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INITIATIVES

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