TESS PROJECT

Grant Agreement n° 603705

WP 1: Inventory of community-based initiatives and selection for in-depth analysis

Deliverable 1.1:

Case study selection method and criteria, including a checklist to evaluate the community-based initiatives

Reference code: TESS – D1.1

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Short Description:

Many European research projects use a case study approach, and subsequently are basing their in-depth work on a set of cases from different European countries. In such studies, like the TESS project, a selection procedure of those cases is to be conducted in a way that simultaneously fulfils the scientific requirements for the whole project and the particular research interests of the consortium. This paper describes how community-based initiatives towards sustainable development were selected for the TESS project.

A selection procedure was aimed at:

(1) finding 12 key initiatives that would work closely with the project and be targeted by in-depth qualitative research interventions, in order to understand success factors of initiatives and to develop relevant MRV methodology for them
(2) obtaining a randomly selected set (48) of supportive cases for verification of the proposed methodology and for evaluating the overall importance of CBIs at European level

First, conceptions of the experts in the consortium, related to case initiatives, were consistently mapped and discussed. Second, initiatives were selected. The selection procedure consisted of mapping the state of art of the CBIs, criteria definition for the selection, and selection. Cognitive mapping, snowball and disproportionate stratified sampling, multi-criteria evaluation with SMART, and approval voting were used as methods in the procedure.

The results of the ex-post evaluation of the selection procedure emphasise a need for joint concept creation and collaboration in early phases of research projects. It turned out to be clear that a straightforward a priori selection process of case initiatives is a challenging endeavour, but an a posteriori selection procedure is also necessary in order to ensure the best possible set of initiatives, providing room for the learning process related to the core research tasks of the WPs.

In particular, the methods, joint selection discussions and decision making about cases between the WP1 coordinator and partners, snowball sampling, approval voting, and multi-criteria expert evaluation of the initiatives were evaluated as beneficial, whereas cognitive mapping and especially, disproportionate stratified random sampling were seen less promising. Further research should target the methodology supporting the problem-structuring phase of the decision-making process.

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List of Abbreviations

3-CM	Conceptual Cognitive Mapping
CBI	Community Based Initiative
CM	Cognitive Mapping
DoW	Description of Work
MRV	Measurement, Reporting and Verification
NVivo	NUD.IST Vivo. A software package to aid qualitative data analysis
SMART	Multi-attribute-ranking method
SRS	Stratified random sampling

1 Executive Summary

Many European research projects use a case study approach and are basing their in-depth work on a set of cases from different European countries. In such studies, like the TESS project, a selection procedure of those cases is to be conducted in a way that simultaneously fulfils the scientific requirements of the whole project and the particular research interests of the consortium. Consistent collaboration and transparent decision making along the selection process are essential. This paper describes how community-based initiatives (CBIs) were selected for the TESS project.

A selection procedure was aimed at:

(1) finding 12 key initiatives which would work closely with the project and be targeted by in-depth qualitative research interventions, in order to understand success factors of initiatives and to develop relevant MRV methodology for them
(2) obtaining a randomly selected set (48) of supportive cases for verification of the proposed methodology and for evaluating overall importance of CBIs at European level

First, conceptions of the experts in the consortium related to case initiatives were consistenly mapped and discussed through. 3-CM cognitive mapping methodology was applied in order to construct transparently and collaboratively the concept map of the members in the consortium related to initiative selection. Mapping results were condensed into a list of criteria candidates, including 28 criteria proposals with priorities. Priorities were conducted from SMART rankings included in the 3-CM task.

Second, initiatives were selected. The selection procedure commenced with mapping the state of art of CBIs. A snowball sampling procedure guided the mapping work, which produced altogether 520 initiatives that were described within the intitiative database with collected variables (Deliverable 1.2). Criteria (criteria set 1 in Figure 2) for including initiatives for the database were jointly accepted in the consortium as follows:

- They are initiated and managed by communities.
- They may have received public money.
- They may be for non-profit as well as for profit; but their overall objectives should serve the community.
- They have been up and running for at least one year.
- They can be located in a city or in the countryside; the focus is on the initiatives and not their spatial/geographical location.
- They operate within at least one of the following 4 domains: Food, Transport, Energy, Waste.

From this database, 320 initiatives were checked to be suitable for the TESS contributions. In this phase, the following aspects (criteria set 2 in Figure 2) were checked for each initiative: clear refusal to participate, no response at all, located too far from the study region, or recently started. If any of these were noticed, the corresponding initiative was then excluded from further research actions. The remaining set of initiatives served as a basic population to select case initiatives for the TESS contributions.

From the basic population, disproportionate stratified random sampling was organised to find supportive case initiatives evenly across partner countries and four domains of TESS. Initiatives' size, duration and organisational form were used as criteria to check that the

supportive initiative set had adequate variation for comparisons (criteria set 3 in Figure 2). If necessary, some adjustments were accepted as far as the randomised order of the initiatives was followed.

Criteria definition for the selection procedure of the key initiatives (criteria set 4 in Figure 2) commenced with approval voting from the criteria canditates. The voting and collaborative decision making of these candidates resulted in the following nine criteria to be used in multi-criteria key initiative selection: (1) value base and (2) community base of the initiatives were analysed in order to understand the orientation of the initiative. Success potential of the intiatives were evaluated by expert judgements focusing on (3) carbon reduction potential, (4) potential environmental impacts, (5) external relations and networking. (6) Initiatives' size and (7) duration were analysed in order to ensure good coverage of the key-initiative set in those dimensions. Finally, (8) willingness to participate and (9) capability to produce required data were checked in order to ensure technical capability of the initiatives for the forthcoming research interventions.

Partners made their proposals for key initiatives in their own country. For this purpose, they organised an expert panel that evaluated all initiatives mapped and included in the basic population of their country. The above-listed five evaluation criteria regarding orientation and success potential were used in the evaluation with a 7-point Likert scale. Overall priorities for the initiatives were calculated, and partners made their proposals using these evaluations to support decisions made. Proposals from all countries were analysed and a total initiative set was adjusted from the project's perspective, taking into account the coverage of the set in terms of size and duration.

The results of the ex-post evaluation of the selection procedure emphasise a need for joint concept creation and collaboration in early phases of research projects. It turned out that joint understanding about research objectives and, thereafter, pragmatic requirements that cases must fulfil, was constructed along the mapping and selection process. An a priori selected proposal for cases increased understanding of the needs. An a posteriori selection procedure is necessary in order to ensure the best possible set of initiatives. This kind of adaptive selection will give room for the learning process related to the core research tasks of projects.

In particular, the methods, joint selection discussions and decision making about cases between the WP1 coordinator and partners, snowball sampling, approval voting, and multi-criteria expert evaluation of the initiatives were evaluated as beneficial, whereas cognitive mapping and especially, disproportionate stratified random sampling were seen less promising. Further research should target the methodology supporting the problem-structuring phase of the decision-making process.

2 Introduction

The main purpose of the Work Package 1 (WP1) of TESS is to conduct a consistent participatory process within the consortium in order to select community-based case initiatives, which will be further analysed in detail during the following phases of the project. The case initiatives will be classified as supportive initiatives and key initiatives. At the end of the process, 40-50 supportive initiatives (6-8 per country) and 14 key initiatives (two per country + 2 extra online initiatives or initiatives outside EU) will be selected.

In the WPs 2-4, TESS and the case studies will collaborate to address two core topics. First, internal and external factors that influence the rescaling and replication of initiatives will be identified through interviews. Second, methods will be developed to assess the impact of initiatives on environment, economy, society, technology and politics.

Selected initiatives support these research actions of TESS. Therefore, the overall utility of cases comes from the initiatives' ability to support research objectives. The main research objectives of WPs with respect to TESS case initiatives are introduced in the Description of Work (DoW):

- WP2 objectives
    - To develop MRV methodology
    - To identify innovative practices
    - To assess potential contribution of initiatives
- WP3 objectives
    - To identify successful initiatives
    - To identify success factors
    - To provide initial recommendations for transition strategies
- WP 4 objectives
    - To estimate aggregate impacts of the initiatives
    - To identify supportive policy environments

The criteria and methods for finding a proper set of initiatives to be studied, and for dividing the cases into key and supportive categories, determine the continuation of the project by offering main research WPs representative study data for solid and accurate findings, which can be then generalised to populations of interest. Therefore, special attention must be given to the decision-support methods and the criteria used in case study selection, in order to ensure that the basis for the selection is scientifically justified.

Several aspects guided the methodology chosen for WP1:

The process and methodology had to be transparent and well argued. The selection of cases was conducted consistently and as objectively as possible, taking into account the specific nature of the research problem, and the fact that the basic population was not known in the starting phase. The decision-aid procedure was based on alternatives and comparisons, enabling the integration of several qualitative and quantitative decision criteria into the same procedure.

Collaborative learning among the consortium and dissemination on the project should be emphasised and supported in every phase of the TESS project. Therefore, in the early phases of the selection process, a lot of attention was given to a joint discussion about underlying concepts and definitions framing the project. All in all, the initiative selection procedure was conducted collaboratively within the TESS consortium (participation level 4, see Dinnie et al. 2013). In addition, relevant stakeholders around the consortium were involved using an information exchange strategy (level 2).

Concrete tasks of WP1 were divided into two main phases: 1. Surveying conceptions related to TESS initiatives; 2. Mapping and selection of TESS cases. In the following chapters, the methodology and criteria used in the selection procedure are presented in detail.

3 Surveying conceptions related to TESS initiatives

Qualitative text data in the form of brief, open-ended survey questions are often applied to gather new information about a topic, and to explore different dimensions of respondents' experiences (Sproull 1988). The inquiry concerning TESS case study initiatives was constructed and sent to researchers of the consortium and to the closest stakeholders (Appendix 1). It included open-ended questions and an Excel worksheet about cognitive mapping questions. The inquiry as a whole was meant to improve common understanding of the criteria that partners consider to be important in choosing case studies, and to construct a joint understanding and motivation towards initiatives within the consortium. Cognitive mapping was used more specifically, to find out issues that partners considered as important selection criteria for choosing case study initiatives of TESS.

The inquiry data, which included cognitive mapping data, offered rich descriptions of respondents' thoughts and conceptions. Research has shown that in comparison to interviews or focus groups, open-ended inquiry questions offer greater anonymity and encouragement to all respondents. Thus they often elicit more honest responses and can also capture a greater diversity in responses than situations in which matters are discussed together (Miles & Huberman 1994, Tashakkori & Teddlie 1998, Erickson & Kaplan 2000, Pothaset et al. 2001).

The inquiry was first sent to one person in each of eight partner organisations, who were then advised to divide the inquiry further between 4-8 persons working within the TESS consortium and stakeholders who were very familiar with the project.

The inquiry was fully completed by 20 respondents. All open-ended answers were analysed and synthesised qualitatively, to support future steps of the case selection process and WPs 2-5. In this context, a context analysis was applied with the NVivo-program to find out what kind of issues the respondents considered important.

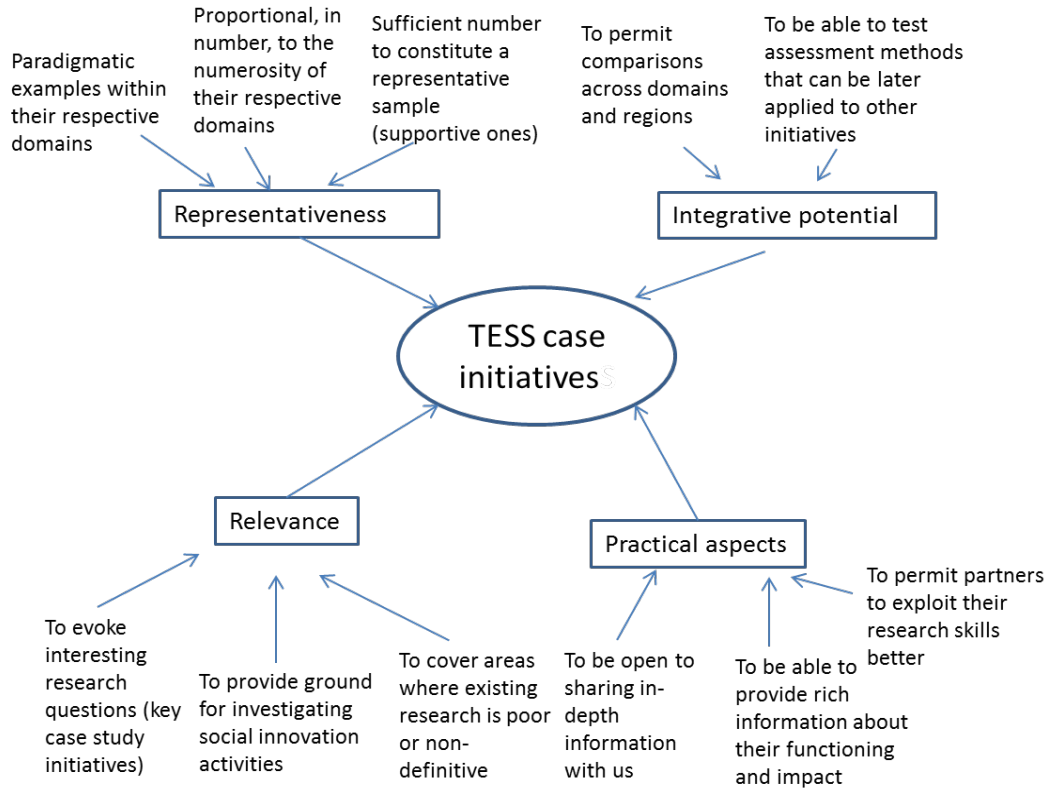
There were two most important issues raised in the inquiry. First, the respondents were worried about whether the sample would be representative enough. To ensure that the amount of supportive cases would be relevant, it was suggested to increase the amount of

supportive cases. Furthermore, the random sampling was proposed instead of a choice of supportive initiatives based on a purposive sampling with commonly accepted selection criteria. Second, an additional question was raised on how to make sure that the coverage of the initiative set was adequate. To handle this, geographical location, domains, innovativeness, and life-spans, among other things, were suggested to be chosen as criteria of representativeness. Furthermore, it was suggested that both success stories and failures should be sampled into the supportive initiative set.

The other part of the inquiry consisted of a cognitive mapping task. Cognitive mapping is a method enabling the researcher to clarify and collect people's conceptions regarding their environment. These ideas are recorded in graphic form, showing the concepts and their interconnections (Sheetz et al. 1994). The individual cognitive maps were derived from the CM task as represented in an Excel sheet, applying conceptual content from a cognitive mapping approach (Kearney & Kaplan 1997). A cognitive map, setting out each respondent's thoughts about features of the TESS case study initiatives, was drawn up with the support of Excel (Appendix 1). The task was presented as follows**: "**The important feature of TESS case study initiatives is to". The respondents were asked to name as many issues as possible by continuing the sentence, then rank them by giving 100 points to the most important issue and 1-100 to others in relation to the most important. This method is an adaptation of SMART (Simple Multi-Attribute Ranking Technique, Edwards 1977, Edwards & Hutton Barron 1994). Respondents were then asked to cluster the issues in groups according to the similarity of their contents. Finally, the respondents were asked to provide titles for the groups, explain their reasoning for the titles, and place the groups in their order of importance.

The cognitive maps thus constructed were converted into table format for presentation in the Excel spreadsheet program, as well as into an illustrative format for the Decision Explorer software (http://www.banxia.com/dexplore/). The inquiry study involved the use of the 3-CM method, which is an implementation of cognitive mapping (open-ended conceptual content cognitive map, Kearney and Kaplan 1997, Kearney et al. 1999) for depicting the features of respondents. This method is explained more closely in Appendix 2. The objective here was to depict and merge the respondents´ conceptions about TESS case study initiatives, in the form of a hierarchical cognitive map. First, cognitive maps setting out each respondent's conceptions separately were drawn up from the inquiry data (Fig. 1).

a)



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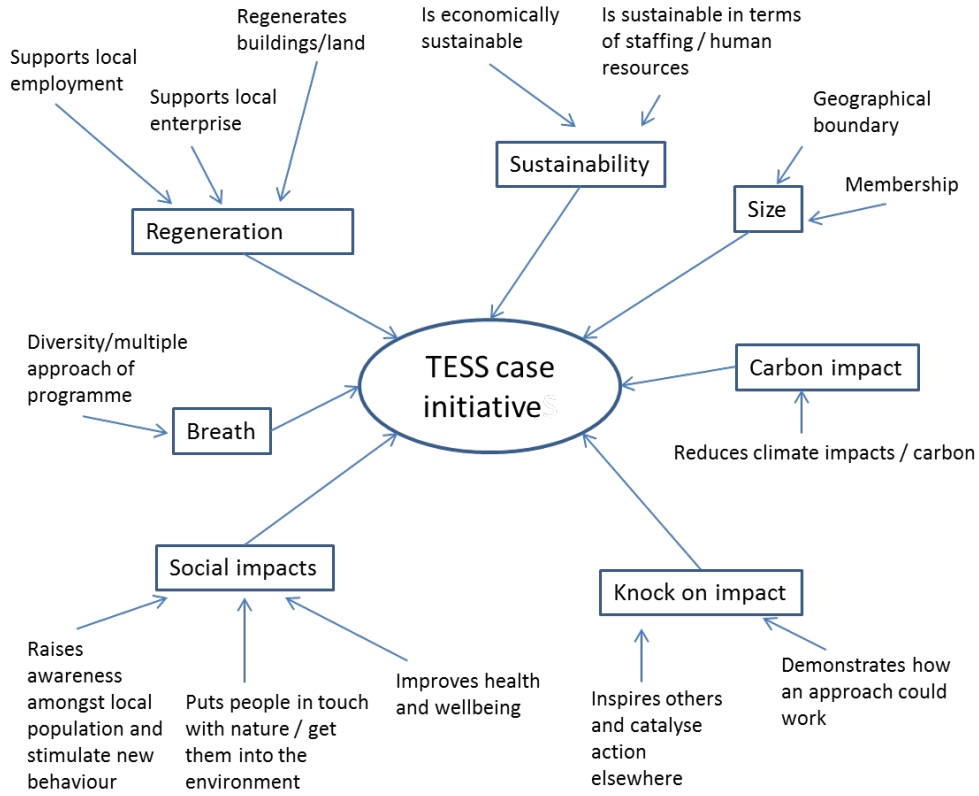

Figure 1. *Two examples of different cognitive maps from two respondents of the partner inquiry. Respondent a) is worried about the representativeness and relevance of the initiative data, and possibilities of generalisation of the study results, whereas respondent b) directly assigns various criteria for selecting the TESS case study initiatives.*

Some respondents of the inquiry mentioned selection criteria or the attributes that selected good initiative examples should look like. On the other hand, some respondents were worried about the representativeness of data and possibilities of generalisation, as well as usefulness and significance of the study results. Furthermore, some respondents also mentioned the expected and desirable results.

In order to synthesise a map, describing all of the respondents´ conceptions, individual cognitive maps need to be analysed simultaneously. This can be done by following a normal qualitative content analysis procedure (e.g. Krippendorff 2004), or by combining qualitative analysis with numerical proximity analysis of the 3-CM approach. Using this method, only results of qualitative content analysis with direct frequencies and means of given weights will be illustrated in detail, as follows.

The partners' suggestions regarding the decision criteria, with respect to TESS case studies based on the inquiry's cognitive mapping part, are shown in Table 1. The frequency of criteria mentioned varied from 1 to 19, and the weights of the criteria from 10.0 to 42.7. It must be noticed that each respondent rated less than half of these criteria.

Furthermore, respondents were asked to mention their worries and expectations regarding the initiative data and study results (Table 2). This question was asked in order to create a joint understanding of the project implementation as a whole. Like the CM results, the worries and expectations dealt mainly with the representativeness and wide coverage of the initiative set of the TESS. In addition, a particular worry was raised about how people of the selected initiatives can be motivated to work intensively with TESS. For this purpose, several proposals were made: "The research intervention of TESS should be kept simple enough, and it is necessary to give initiatives a clear message as to how the project matters and what the benefits of participation are to them. Initiatives might appreciate if the feedback and policy recommendations of TESS were given to decision makers at different levels of policy making (i.e., at local as well as at EU level).

It might be reasonable to invite representatives of the initiatives to participate in TESS meetings and/or to organise joint workshops with the TESS research consortium and initiatives. Initiatives should have specific notions in the TESS platform."

***Table 1**. Respondents' suggestions regarding the decision criteria, with respect to TESS case studies (Inquiry: Cognitive mapping) and combined with criteria classes. The frequency denotes how many times each criterion has been mentioned and rated, and weights of the criteria have been derived from the inquiry based on ratings of criteria and classes.*

	Selection criteria	Frequency	Class definition	Weight
1	Environmental impacts	19	Positive environmental impacts (e.g. reduction of energy consumption, waste reduction, supportment of the multiple use of natural resources instead of intensive use)	**34,9**
2	Participation willingness	19	Initiative is co-operative, trustful, eager partner in shaping and carrying out the research and disseminating the findings	**19,5**
3	Organisational structure	17	Orgizational structure is efficient, simple etc.	**19,9**
4	Innovativeness	16	Initiative inspires innovative solutions (e.g. energy)	**24,8**
5	Catalyser of action	16	Stimulates action and changes outside community (good example, demonstration)	**23,2**
6	Social impacts/Raise fellowship	16	Initiative raises fellowship, collaboration and solidarity	**20,3**
7	Carbon reduction	13	Carbon reduction	**30,9**
8	Political power	13	The initiative has power through policy making	**19,7**
9	Data availability	12	Intiative collects data from its activities and achievements, disseminates and publishes actively	**16,4**
10	Outcomes	11	The initiative has concrete outcomes	**26,4**
11	Underlining "green" motivation (Sustainability)	10	The Initiative aims at contributiong overall transition towards sustainability	**37,3**
12	Social impacts/Improvement of health and wellbeing	10	Social impacts/Improvement of health and wellbeing	**21,7**
13	Social impacts/To change behaviour	9	Social impacts/To change behaviour	**32,6**
14	Size	9	Size of the initiative (members, area, customers)	**26,6**
15	Social impacts/Other social impacts	9	Social impacts/Other social impacts	**17,8**
16	Transferability	8	Expansion potential, replicability, capacity to multiply itself, initiative is such that it can be adopted to use elsewhere in Europe	**42,7**
17	Economic impacts/Regeneration	8	Supports local resources, infrastructure of some type and projects, uses local resources more efficiently, preserves local resources	**22,5**
18	External relations/Networking	8	Initiatives have an influence on their surroundings and other initiatives and/or are actively networking.	**15,6**
19	Upscaling	7	Upscales or contain a promise for upscaling	**31,4**
20	Economic impacts	7	Overall economic impacts to the area	**23,7**
21	Power	6	Initiative is very active, flexible, transparent etc.	**21,6**
22	Commitment	4	People are very committed to the matter	**31**
23	Providing services	4	Initiative is providing services to the community, which sometimes the public admininstration (or other organisation) is not providing (anymore)	**17,6**
24	Openness	3	Provides easy access for others to join	**39,1**
25	Diversity	3	Initiative operates multiple levels or domains	**31,9**
26	Economic impacts/Local enterprises, entrepreneurs	3	Provides direct benefits to local entrepreneurs, enterprises	**14,9**
27	Resilient	3	Initiative is resilient, strong, organised as durable actions	**13,5**
28	Social impacts/To raise awareness	2	Social impacts/To raise awareness	**22,9**
29	Risk management	2	Initiative's ability to handle conflicts and crises	**17**
30	Self-sufficiency	2	Uses local resources and experiences	**15,8**
31	Economic impacts/Wellbeing	1	Provides direct benefits for area's households	**16,7**
32	Economic impacts/Employment	1	Provides employment (directly and indirectly)	**10,7**
33	Duration	1	The time that initiative has been operating	**10**
	Total	**272**		
	(Inconditional) selection criteria	**Frequency**	**Class definition**	
34	Definition of the initiatives	12	Initiative meets the definitions (e.g. starting point, in operation, operation time, operates at least one of four TESS domains)	**32,6**
	Total	**12**		

Table 2. *Respondents' worries and expectations (Inquiry: Cognitive mapping) related to the TESS project, in combined content classes. The frequency denotes how many times each subject has been mentioned.*

Worries ab	**Worries about mapping and selection**		
35	Representativeness of study data	13	The amount and variability of study initiatives should be representative enough that it will permit to extend/generalise the research findings (e.g. region, organisational structure)
36	Representativeness of study data/domain	1	
37	Representativeness of study data/sufficient amount of case initiatives per domain	4	
38	Representativeness of study data/sufficient amount of case initiatives per region	1	
39	Representativeness of study data/representative sample of case initiatives	1	
40	Representativeness of study data/also failed initiatives	2	
41	Integrity of the study data	2	Study data should be integrative enough to enable comparisons and assessments across domains and regions
42	Integrity of the study data/quantitativeness	2	
43	Integrity of the study data/ across domains	1	
44	Integrity of the study data/ across regions	2	
45	Integrity of the study data/ test data for assessment methods	2	
46	Relevance of study data	11	Study data should be interesting, innovating and rewarding
47	Relevance of study data /evoke interesting questions	2	
48	Relevance of study data/(social) innovative activities	1	
49	Relevance of study data/ cover areas where existing research is poor or non-definitive	1	
50	Problems with mapping	5	No contact persons etc.
51	Involvement	4	How initiatives can be involved as active research partners
51	Collaboration	1	Equitable and productive collaboration with initiatives
	Total	**56**	
	The results of the study		
53	Internal success factors	9	Identifying internal factors such as skills, connections and experience within the group of people involved with the initiative
54	External success factors	10	What external factors are there in the community/region/country that affect initiatives and how they affect them
55	Producing and diffusing knowledge/transferability	4	How initiatives motivate, convey and cause change
56	Producing and diffusing knowledge/public relations	3	How initiatives collaborate with public sector
57	Producing and diffusing knowledge/differences	2	How does the context differ across initiatives, regions and countries and how does this affect initiatives?
58	Producing and diffusing knowledge/education, learning	5	Educational or training activities and building awareness of environmental themes
59	Producing and diffusing knowledge/Factors and practices of failure	4	Factors and practices which lead to failure
60	Producing and diffusing knowledge	24	
61	Providing support to initiatives	1	To involve stakeholders actively and provide them with support, networking opportunities, and different forms of resources
	Total	**62**	

4 Criteria and procedure of mapping and selecting TESS case study initiatives

4.1 Criteria and initiative sets of TESS

The initiative sets and corresponding criteria sets for determination are presented in Figure 2. All initiatives that fulfil criteria set 1 were found through the sampling procedure (described below and in Appendix 2), and are saved into the TESS database of initiatives. From this database, firstly it was decided, with criteria set 2, which initiatives among all initiatives found were accepted into the basic frame of the TESS sampling procedure. Secondly, supportive initiatives were selected from the database with criteria set 3, and thirdly, key initiatives were selected from the database with criteria set 4. The criteria and procedure of mapping on each phase was planned and decided together with all the partners, as presented in detail in the following chapters.

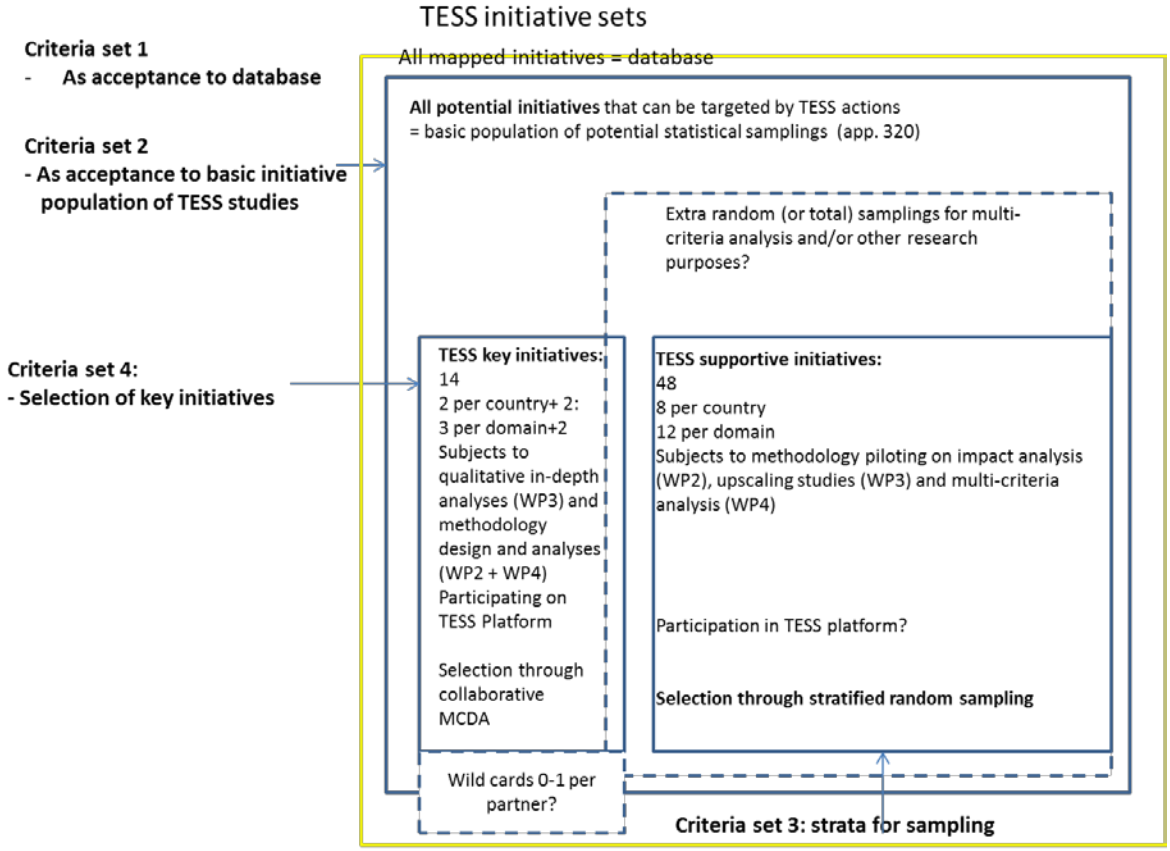

Figure 2. *Initiative and criteria sets of TESS*

4.2 Criteria set 1: TESS database

The DoW gave preliminary definition for TESS´s concept of community-based initiative. The definition was discussed and further explicated in opening meeting of TESS, and finally a working definition (Box 1) was given in order to guide the initiative-mapping process.

Box 1. Criteria set 1. Working definition of community-based initiatives:

- They are initiated and managed by communities.
- They may have received public money.
- They may be for non-profit as well as for profit, but their overall objectives should serve the community.
- They have been up and running for at least one year.
- They can be located in a city, or in the countryside; the focus is on the initiatives and not on their spatial/geographical location.
- They operate within at least one of the following 4 domains: Food, Transport, Energy, Waste

Data collection guidelines, an Excel file for mapped data with instructions and a clarifying letter were sent to each partner to begin the mapping of TESS case study initiatives. Every TESS partner defined first the geographical focus region (region = TESS definition for study areas of partners) of the initiatives explicitly in their countries, taking into account the project focus on "innovative city regions", population of the regions, and the supposed amount of innovative cases. There was also a possibility to enlarge or reduce the focus region if needed, depending on the amount of initiatives produced by snowball sampling. The area of the focus regions varied a lot between partners: e.g. in Finland, the focus region was the whole of Finland, whereas in Italy, the region comprised the area of Rome and its surroundings.

In order to produce an exhaustive mapping of initiatives in the selected focus regions, a snowball approach was adopted (Appendix 3). The primary advantage to snowball sampling is its success in identifying individuals from unknown (and potentially very large) populations beyond any known segments of the population. In the case of the population of initiatives, a random sample was not possible, and snowball sampling provided a way to identify initiatives that otherwise might not have been included in the sample. Another advantage was that a sample could be produced quickly and cost-effectively. In a snowball sampling, a preliminary list of a few initiatives, i.e. 3-10 for each domain, was prepared on the basis of secondary information as a starting point for sampling. Those initiatives were also contacted in order to collect some preliminary information (see *initiative database* structure in Appendix 4), and were asked 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, etc. If the contacted initiatives did not respond, or refused to answer the questions, they were excluded from TESS case study initiatives.

A stopping rule for mapping was also determined. As soon as the snowball identification began 'looping', i.e. the initiatives indicated by those that had been contacted were already part of the sample, the mapping could be considered concluded. However, if this happened very soon with a very limited number of mapped initiatives, mapping could be started again from another initiative discovered through secondary data. In case the amount of initiatives

was to exceed manageable limits, the region would need to be limited, such that the number of initiatives could be managed.

The Excel database sheet supplied included also two fill-out worksheets about snowball sampling, in which relations between mapped initiatives were marked

1) based on awareness of other initiatives
2) based on collaboration with other initiatives.

The information gathered through this methodology not only guarantees a regionally thorough mapping, but can also be used for social network analysis/drawing and/or, more generally, to investigate networking among initiatives.

A good set of initiatives was needed for the TESS *initiative database* as a basic population for all research interventions. The number of mapped initiatives in each domain (food, transport, energy and waste) had to be exhaustive to ensure the variability and comparability of the mapping data in each region. To achieve that, a much bigger number of initiatives was mapped than would finally be targeted to research interventions.

The minimum number of mapped initiatives per region was instructed to be at least 30**.** This also ensured the comprehensive sample of initiatives at European level. All mapped initiatives are now included in the TESS *initiative database*.

The database administrator (DBA) of the *initiative database* in this first mapping phase was OUAS. Database administration prevents simultaneous updating of the database, which can cause, for example, accidental disappearance or change of some data. After all partners had stopped their mapping of the initiatives, the databases of the partners were merged. In this phase, they were synchronised; thus, there were a few different markings depending on the partner. Furthermore, all initiatives were checked in terms of suitability for TESS data cases. All suitable initiatives were clearly separated from the unsuitable ones. The suitability of the initiatives was derived from the definition of “community-based initiative”. This phase was conducted in OUAS.

After the merging and checking all of the initiatives, partners conducted the final check of their initiatives in the merged database. If data still included any confusion or errors, they were corrected. Finally, the respondents gave their final approval to publish the database.

4.3 Criteria set 2: The basic initiative population of TESS studies

After the *initiative database* was established, the initiatives were qualified in terms of suitability for TESS research interventions. A working definition of community-based initiatives (Box 1) served as a starting point for acceptance criteria: it was re-checked jointly in the consortium. Some exceptions were accepted in the working definition, due to feedback received during the mapping. For example, ended initiatives were also accepted if there were suitable data available. Moreover, enterprises were accepted if they were

originally community-based. Other acceptance criteria used to check initiatives' eligibility for the TESS study objective included the following aspects:

- clear refusal to participate
- no response at all
- located too far from the study region
- have recently started

This eligibility check was undertaken jointly by the database holder from OUAS and the partner organisations. Dropping non-respondents could cause some selectivity bias, because within those initiatives there might be reasons related to certain characteristics such as lack of openness and communication. However, this might also be a question for the case of those study initiatives that responded to questions but refused to publish their names and contact details in public, and which are included in the *initiative database*.

4.4 Criteria set 3: Supportive case studies

4.4.1 Objectives

40-50 supportive case studies encompassing all sectors and regions were compiled, to apply and refine the methodologies developed in TESS. These studies provide the basis to conduct the cross-sectorial and cross-regional assessment in WP2 and the multi-criteria cost-benefit analysis in WP4. The selected case studies act as a benchmark for the scoreboard presented on the TESS interactive platform, and lay the foundation for the final policy advice on multiple scales provided by the TESS project.

4.4.2 Procedure for selection

Based on partner inquiry analyses, phone conferences and email discussions, it seemed that the representativeness and variability of the study data were considered very highly when deciding the selection method and criteria behind the data selection Thus, the attitudes of most partners changed from the original plan, i.e., from selecting supportive initiatives based on pre-defined criteria and ratings towards random sampling. Finally, it was decided to use stratified random sampling (SRS) to improve the representativeness of the sample of supportive initiatives. Furthermore, a participation willingness and availability of suitable data for TESS research interventions will be used as criteria to ensure the research contribution of supportive initiatives.

4.4.3 Criteria serving stratified sampling

Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. In stratified random sampling, the strata are formed based on members' shared attributes or characteristics. A random sample from each stratum is normally taken in a number proportional to the stratum's size when compared to the population. However, in TESS's case, random samples are equal sizes between strata, with two main strata and with the minimum size requirement for three other strata. In this kind disproportionate stratified random sampling, the different strata do not have the same sampling fractions as each othe r (Sapsford & Jupp 2006). These subsets of the strata are

then pooled to form a random sample. There are two strata that were decided to be used together in disproportionate SRS sampling, to ensure representativeness and variability of the supportive initiatives. The strata are country and domain. In addition, it is verified that there is enough variation in size, duration and organisational structure after sampling.

4.4.4 Methodology followed in sampling

Sampling was conducted by OUAS. One stratum was decided to be country (Särndal et al. 2003). Eight initiatives from all partner countries were accepted for the sample, designating 48 supportive initiatives altogether, which is within the range of the amount stated in the DoW (40-50). The other stratum was decided to be domain, and in this case, the selected initiatives should be divided evenly between four TESS domains at European level. In addition, it was decided that there should be 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. These three dimensions are observed at European level.

The first sample of disproportionate SRS should be flexible. Some chosen initiatives might have too few or too unreliable data, and some initiatives may refuse closer co-operation. Some chosen initiatives can be almost identical; thus, it is not reasonable to use both. When facing these kinds of obstacles, partners will have an opportunity to change initiatives for obligatory reasons, as long as the amount of the initiatives in the jointly-agreed subgroups does not change. Changing the chosen initiative to another initiative in the same domain should be performed based on the randomly sampled order of the first sample. The substitution is conducted by partners jointly with OUAS.

4.5 Criteria set 4: Key initiatives

4.5.1 Objectives and procedure

Key initiatives serve as a main source for qualitative analysis of the TESS and as a piloting platform for research methodology developed in TESS. According to the DoW, the amount of key initiatives has been limited to 14. Key initiatives are supposed to be examples of successful cases that have potentials for up-scaling. On the other hand, according to cognitive mapping results, the key initiative set as a whole is valuable if enough variation exists within it.

These requirements led to the selection procedure that took into account the potential success factors of the proposed key initiatives, and ensured the coverage of the initiative set. Success measures cannot be calculated in exact objective terms when the project has just started, and the measurable data on the impacts of the initiatives will be collected along forthcoming phases of the project. Therefore, the selection procedure of key initiatives was based on the expert judgements: it was a participative learning process, using a multi-criteria approach to guide sequences of expert evaluations. The procedure followed three main phases: (1) definition of criteria, (2) ranking the initiatives and (3) selection of the initiatives.

Multi-Criteria Decision Analysis (MCDA) methods like voting and SMART were used in this context; thus, other methods, i.e., Analytic Network Process (ANP, Saaty 1977, 1996a) and Analytic Hierarchy Process (AHP, Saaty 1996b), were also suggested in the DoW. One main reason why we decided to use MCDA instead of those other methods was the large amount of selection criteria at the beginning. A central difference, when compared to AHP and ANP, is that SMART does not use pairwise comparisons but instead direct ratings. In basic AHP, the number of comparisons increases rapidly as the number of alternatives and criteria increase. Large numbers of comparisons might have been too tedious for participatory planning problems, and at least in the beginning with substantial criteria. With ANP also, the number of decision and/or preference criteria should be considered rigorously, since the amount of pairwise comparisons increases exponentially with the number of criteria and their interdependencies. Furthermore, the semantics used in pairwise questions should be determined carefully in both AHP and ANP.

The MCDA methods used also comprised voting methods. Use of voting methods has proved to be an efficient tool for making choices among decision alternatives; moreover, it is familiar to everyone (Pykäläinen et al. 2007). Voting is hard to manipulate, and in addition, approval voting is argued to be the best voting system in most cases.

4.5.2 Definition of criteria for key initiative selection

The results of the partner inquiry, including cognitive mapping (see chapter 3), were used to define 26 criteria candidates altogether (Table 3).

Selection of criteria for further analysis among candidates was conducted through approval voting (e.g., Brams & Fishburn 1983, Kangas et al. 2006). The voting was conducted by the teams of partner organisations, so there were 8 voters altogether. Instructions and data-format were given to the partners by OUAS (Appendix 5).

In voting, every partner organisation chose ten most suitable criteria for selection of key initiatives among the candidates (Table 3). They were guided to focus on the relevance of the criteria from the view of the TESS research questions (see page 1). In the Excel sheet, there was also room for proposals for new criteria and for clarifying comments on the criteria.

Table 3. *A voting task given to partners for the key study selection, including 26 criteria candidates with definitions, frequencies and weights derived from partner inquiry results, and a column for voting.*

Perspective	Criteria	Criteria definition	Your choice (1=included) Max 10	Freq	Weight
Impacts/environmental	**Carbon reduction**	Carbon reduction		13	30.9
	Environmental impacts	Positive impacts to environmental processes (e.g. reduction of energy consumption, waste reduction, support of multiple use of natural resources instead of intensive use)		19	34.9
Impacts/ social	**Health and wellbeing**	Impacts to the health and wellbeing of society		1	16.7
	Community cohesion	Raises fellowship, collaboration and solidarity in society (Suggestion: the diversity among social classes and racial class involved in the initiatives. "Participants heterogeneity" or "participants diversity in terms of race and social class"?.)		16	20.3
Impacts/Economical	**Economic wellbeing**	Provides benefits for area's households		1	16.7
	Employment	Provides workplaces		1	10.7
	Local enterprises and	Provides benefits for local enterprises and entrepreneurs		3	14.9
Values	**Value base**	The underlying high motivation towards sustainability		10	37.3
	Commitment	People are committed to the matter of the initiative		4	31.0
	Community based	Is grassroot based at the beginning.		4	41.0
Upscaling/regeneration potential	**External relations/Networking**	Influence on their surroundings and other initiatives and/or are activily networking.		8	15.6
	Openess	Provides easy access for others to join		3	39.1
	Power	Active, flexible, transparent etc. and/or has power in policymaking (Suggestion: the degree to which initiatives are involved in political actions at different levels)		6	21.6
	Providing services	Providing services, projects or infrastructure of some kind to the community, which sometimes the public admininstration (or other organisation) is not providing (any more)		4	17,6
	Innovativeness	Inspires innovative solutions (e.g. energy innovations)		16	24.8
	Catalyser of action	Stimulates action and change outside community (good concrete example, demonstration)		16	23.2
	Awareness	Raises awareness towards sustainable development in society		2	22.9
Resiliency	**Size**	Size of the initiative (members, area, employees, volunteers, customers)		9	26.6
	Diversity	Operates multiple levels or domains		3	31.9
	Organizational structure	Orgisational structure is efficient, simple etc.		17	19.9
	Duration	The time that initiative has been operating		1	10.0
	Risk management	Ability to handle conflicts and crisis		2	17.0
	Self-sufficiency	Uses local resources and experiences		2	15.8
Capability to support research intervention	**Data availability**	Collects data from its activities and achievements, disseminates and publishes actively		12	16.4
	Willingness to participate	Is co-operative, trustful, eager partner in shaping and carrying out the research and disseminating the findings		19	19.5
	Replicability	Can be adopted to use elsewhere in Europe		8	42.7

Based on the voting results (Table 4), the criteria to be used in initiative ranking were decided jointly in a teleconference following unanimous selection rules:

- criteria that more than half have voted for were selected directly
- criteria that less than one quarter voted for were excluded directly
- other criteria we jointly decided in teleconference through discussion.

Thus, other criteria consisted of those initiatives which got 3-4 votes, and from those, selected ones were accepted by all the participants in the teleconference.

Finally, nine criteria altogether were chosen for use in the key-initiative selection procedure: community base, value base, willingness to participate, duration, data availability, environmental impacts, size, carbon reduction, and external relations/networking. Information for some of these, like duration, were already available; as for the rest of them, for example, carbon reduction, partners based the ratings on expert judgments. Of course, scaling must then be rather nomimal.

Table 4. *Voting results of initiatives. Initiatives in green colour were directly chosen and red directly excluded. Among the initiatives in yellow, size, carbon reduction and external relations/networking were finally chosen.*

	PIK	UAB	T6	Sapienza	CF	JHI	USV	OUAS	
Criteria	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Sum**
Community base	1	1	1	1	1	1	1	1	**8**
Value base	1	1	1	1			1	1	**6**
Willingness to participate	1		1	1	1	1	1		**6**
Duration	1	1	1	1		1			**5**
Data availability	1		1	1	1	1			**5**
Environmental impacts	1				1	1	1	1	**5**
Size	1		1				1	1	**4**
Carbon reduction	1	1				1			**3**
Commitment			1	1				1	**3**
Openness		1		1				1	**3**
Catalyser of action		1		1		1			**3**
Awareness		1			1	1			**3**
Self-sufficiency		1				1		1	**3**
Local enterprises and entrepreneurs					1		1	1	**3**
External relations/Networking			1			1	1		**3**
Economic wellbeing					1			1	**2**
Providing services		1				1			**2**
Replicability				1	1				**2**
Community cohesion					1		1		**2**
Health and wellbeing								1	**1**
Power					1				**1**
Diversity			1						**1**
Risk management		1							**1**
Innovativeness							1		**1**
Organisational structure							1		**1**
Employment									**0**
Other (Disqualification):									

4.5.3 Ranking of the initiatives based on the evaluation criteria

The nature of the selected nine criteria varies in the selection procedure. Willingness to participate and data availability are obligatory requirements in order to enable research interventions of TESS; thus, they are used in evaluation on a nominal (dichotomy) scale for checking eligibility of the initiatives. By the same token, it was considered valuable to have good coverage of different kind of cases in terms of duration and size, in the TESS key initiative set. Therefore, these two criteria were used in checking the representativeness of the initiative set. Finally, the remaining five criteria were used, in an interval scale, for measuring the potential success of the initiatives.

The ranking task, and the framework for it, are presented in Appendix 6. Partners rated initiatives in respect to five criteria. In evaluation, verbal judgments were used, which were

then translated to an ordinal numerical scale, and a verbal argumentation of the rating was also requested.

4.5.4 Selection of the key initiatives

Based on the ranking task, partners decided their first proposal for the key initiatives. Rating of the initiatives was meant to be only a decision support tool; thus, the partners conducted the final selection after ranking, but the ratings and selection procedure had to be documented. In addition to those two most preferable initiatives, partners were also asked to give two optional initiatives, which could be used if there was a need to adjust the initiative set as a whole in order to get good coverage of initiatives in terms of domain, duration and size.

Before the proposal, partners checked its technical suitability by two unconditional, “nominal scale” criteria. For example, it was necessary to ensure in this phase that probable key initiatives are really willing to and can participate intensely, and that they really can provide relevant data for TESS.

To adjust the key initiative set according to initiative set-level criteria, OUAS conducted an overall synthesis in order to check that, among proposals, there were initiatives from all domains and enough variation in terms of size and duration. Based on the synthesis, OUAS had bilateral discussions with partners and adjusted the initiative proposals from the overall perspective. Adjustments of the initiatives were performed based on the partners´ proposals and numerical rankings, while the partners made their final suggestions based on their subjective expert knowledge. All the suggested initiatives were ranked high, most of them first or second.

Final selection of the initiatives was made in a meeting of partners held in Barcelona. A synthesis of proposals was constructed with arguments before the meeting, and the final selection of key initiatives was finalised according to joint discussions.

4.6 Serving room for innovations and adaptation to forthcoming information needs

In order to enable innovative adaptation of the research alongside forthcoming actions, it was agreed that partners can choose an extra key initiative if promising and/or interesting initiatives appear later. Decisions regarding the choice of an extra initiative must be well argued and openly discussed within the consortium.

Besides these two samplings (supportive and key initiatives), it was decided that ad-hoc samples could be taken from the basic population for specific research purposes. For instance, for some purposes, there might be a need to enlarge the sample from the 48 current supportive initiatives; or in some cases, it might be reasonable to target surveys at all the basic population. The criteria and procedures for these are to be discussed together in the consortium. In each case, coordination will be undertaken by the partner having this specific research need.

5 Conclusions

Many European research projects use a case study approach, and subsequently are basing their in-depth work on a set of cases from different European countries. In such studies, like the TESS project, a selection procedure of those cases is to be conducted in a way that simultaneously fulfils the scientific requirements for the whole project and the particular research interests of the consortium. This paper describes how community-based initiatives towards sustainable development were selected for the TESS project.

A selection procedure was aimed at

(1) finding 12 key initiatives which would work closely with the project and be targeted by in-depth qualitative research interventions, in order to understand success factors of initiatives and to develop relevant MRV methodology for them
(2) obtaining a randomly selected set (48) of supportive cases for verification of the proposed methodology and for evaluating the overall importance of CBIs in European level

The leading principles of selection were participatory and transparent procedures, and objectivity. As such the planned strategy was an a priori one, aiming at a complete list of initiatives to be selected before undertaking detailed planning of forthcoming steps in the research process. Relevant stakeholders around the consortium were involved in the selection process, using an information exchange strategy. In addition, stakeholders were involved in the first phase of the selection process, in the partner inquiry. Responses from a few stakeholders designated that the conceptions and initiative selection criteria did not differ from those involved with the project. A deeper participation of stakeholders in the selection process would have demanded the proper familiarisation with the research needs of the project.

The methodology used along the selection process included snowball sampling, 3-CM cognitive mapping, SMART (Simple Multi-Attribute Ranking Technique), approval voting, and multi-criteria analysis using the Likert scale. After completion of the process, feedback from the partners involved along the mapping and selection process was collected through Zef® methodology.

In particular, the methods, joint selection discussions and decision making about cases between the WP1 coordinator and partners, snowball sampling, approval voting, and multi-criteria analysis were evaluated as beneficial, whereas cognitive mapping and especially, disproportionate stratified random sampling were seen less promising. There was a criticism against random sampling because some partners saw it as unfair or unsuccessful from their point of view. On their behalf, some criticised that some partners followed the selection process loosely, based on their own preferences, when all partners should have been following the same process. In case of cognitive mapping, the purpose and the usefulness of the method should have been explained better.

The results of the ex-post evaluation of the selection procedure emphasise a need for joint concept creation and collaboration in early phases of research projects. According to feedback results and experiences along the process, further research and development work

should target the methodology supporting the problem-structuring phase of the decision-making process (Vacik et al. 2014).

It turned out to be clear that a straightforward a priori selection process of case initiatives is a challenging endeavour, but features of an a posteriori selection procedure are necessary in order to ensure the best possible set of initiatives, providing room for the learning process related to the core research tasks of projects.

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Appendix 1. *Inquiry for Partners*

TESS Inquiry 24.2.2014

Dear colleague,

Thank you for your interest in participating in this inquiry for WP1 of TESS.

Your answers will help us to:

- improve our understanding of the criteria that partners consider to be important in choosing case studies
- rank the criteria for choosing case studies
- construct a joint understanding and motivation towards initiatives within the consortium

Please answer first the following questions concerning your background and personal considerations related to case study initiatives, i.e. key and supportive initiatives. Afterwards, please answer the 3-CM-questions included on an Excel worksheet.

All open-ended answers will be analysed/and synthesised qualitatively, to support future steps of the case selection process and WPs 2-5. By the aid of the 3-CM task in the Excel sheet, we aim to obtain quantifiable information related to criteria definition.

On completion, please return the fulfilled Word document as well as the Excel sheet to OUAS. The deadline to submit the filled-in inquiry is 7th March 2014. If you have any questions, please do not hesitate to contact us.

Remember that there are no right or wrong answers, only your own individual opinions, and we hope to hear as many ideas as possible.

Contact and personal information

1. Name:

2. Email address:

3. Organisation:

4. Academic interest:

5. Do you have any personal scientific interest in TESS? (if Yes, please answer the next question)

6. Which aspects of the TESS research programme are you most interested in?

Questions about TESS study initiatives

8. What is the purpose of key and supportive initiatives in the TESS project? Why do we need them?

9. Please tell in your own words about the criteria that are important to consider when mapping and selecting key and supportive initiatives for the TESS project.

10. Do you have any hopes and/or concerns in relation to the selection of TESS case study initiatives?

Please fill out now the included Excel worksheet of 3-CM-questions. In this sheet, you can use issues you raised above, and/or you can create new ones. Again, it is important to mention as many issues as possible. The 3-CM method is introduced in Appendix_3-CM in the TESS google drive (WP1/Cognitive Mapping folder).

Please add your name here:

The important feature of TESS case study initiatives is to .....

1.1 Name in cells B16- B49 as many issues as possible by continuing the sentence. (Yellow cells)

1.2 Rank the issues by giving 100 points to the most important issue and 1-100 to others in relation to the most important. (E.g. 80 points is two times as important than 40 points). (Green cells).

You can give some issues same points meaning that their importance is equal.

2.1 Cluster the issues by **copying** the sentences and by pasting them into the same group according to similarity of their content. (Columns D-K, Rows 16-27). Blue cells.

Groups can consist of 1-m issues.

2.2 Give the short headings to the groups (Column D-K, row 15). Orange cells.

2.3 Explain what connects issues into same group , Columns D-K, row 29. Red Cells

2.4 Evaluate the importance of the groups by giving 100 to the most important group and 0-100 to others with respect the most important. Column D-K, Row 30. Brown cells.

		Group 1	Group 2	Group 3	Group 4
Purpose/objective issues:	Ranking of issues	Theme:	Theme:	Theme:	Theme:
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...					
The important feature of case study initiatives is to...		Rationale of the grouping:	Rationale of the grouping:	Rationale of the grouping:	Rationale of the grouping:
The important feature of case study initiatives is to...		0-100	0-100	0-100	0-100

Appendix 2. 3-CM-Cognitive Mapping (Conceptual Cognitive Mapping)

Cognitive mapping

Cognitive mapping is a method that enables a researcher or planner to clarify and save people's conceptions regarding their environment. These ideas are recorded in graphic form showing the concepts and their interconnections (Fig. 1). Cognitive maps helps people organise and categorise various concepts. They link main ideas or thoughts with sub-ideas or sub-categories. This allows the creator and other viewers to visualise these concepts.

In participative planning processes, attention should be paid to the constellation of goal queries; thus, preference elicitation may carry biasing effects, owing to question framing or concepts offered by the analysts (Tversky and Kahneman 1981; Morton and Fasolo 2009). Therefore, respondent-driven querying methods, such as cognitive mapping (Eden 1992, Kearney and Kaplan 1997, Eden and Ackermann 1998), are advisable in order to avoid unwanted distortions.

Cognitive maps provide a holistic picture of an individual's overall perspective, without the loss of any detail; this enables researchers to move beyond the assumption of internal consistency towards the detailed assessment of specific concepts within the map. Concepts can be elicited from existing documents (Axelrod, 1976), open-ended interviews of research subjects (Bennett and Lehman, 2002), questionnaire responses from research subjects (Robert, 1976), or from the research participants directly (Kaplan and Kearney 1997).

In cognitive mapping, self-defined constructs represent the causal knowledge of, e.g., a decision maker or an expert, depending on the task, in the form of a map of their own subjective world. Cognitive maps can be seen as a model of action-orientated thinking about a situation, where arrows signify influences in a line of argument linking cause and effect (Eden, 1992). The objective of conceptual cognitive mapping is usually to assess the structure and content of an individual's knowledge structure, but there is a wide variety of techniques for deriving and analysing these maps. Cognitive maps can be analysed through interpretative coding (where individual concepts are interpreted), in terms of their content (the meanings they contain), and in terms of the complexity of configuration of the maps (for example, link to node ratio, cluster analyses). Generally speaking, most techniques comprise three parts: eliciting concepts, refining concepts and identifying relationships between concepts (Tegarden and Sheetz, 2003). Relationships are identified using qualitative analysis with scope for rich description, and typically also involve some type of quantitative analysis, on occasion using multivariate techniques (Kaplan and Kearney, 1997).

There are numerous approaches to cognitive mapping. Here is one possible approach for collaborative planning situations:

1. ***Individual cognitive mapping.*** Stakeholders are interviewed individually in a relatively unstructured way, to try to elicit their thoughts about the problem under discussion. From this discussion, cognitive maps are drawn to help each individual refine their thinking.

2. ***Map combination.*** Individual cognitive maps are combined into a composite map that represents the beliefs of a group. Initially, the map may contain several hundreds of concepts. Similar concepts are merged into one, while maintaining a balance of concepts from all members of the group. To make the map manageable, the concepts are arranged into clusters containing between 15 and 30 concepts. The final merged map is an overview map at the cluster level, showing links between each cluster. This map can serve as a focus for following discussions.

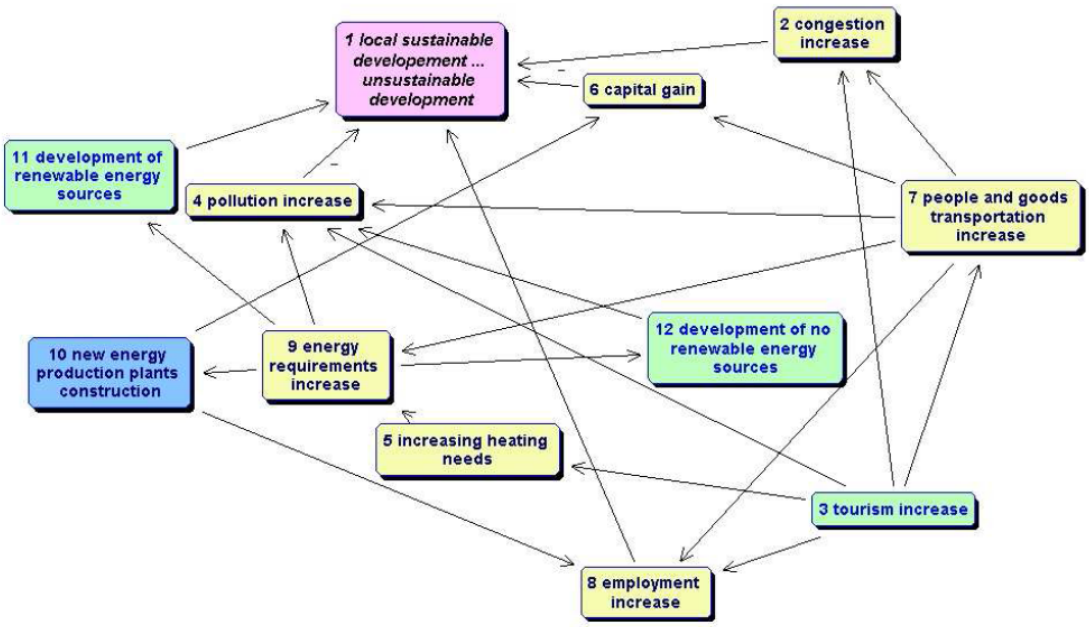

Fig. 1. *Example of a cognitive map of sustainable development (Albino 2003). Cognitive maps for eleven postgraduate students (master and doctoral students) that live in the Mediterranean area were developed, and their differences were analysed. They were asked separately to talk about their ideas of sustainable development, their opinions about key issues, strategies and main options. After the interviews, the attendant cognitive maps were developed.*

3-CM method of partially overlapping individual concept lists

The Conceptual Content Cognitive Mapping technique (3-CM method) is an implementation of cognitive mapping (Kearney and Kaplan, 1997, Kearney et al., 1999). In the method, knowledge structures are derived directly from participants. When respondent-driven queries are applied to large groups, a detailed analysis of connections between given concepts appears unfeasible. A solution might be to divide the goal analysis into two subsequent phases: (i) deriving the concept list and initial priorities, and (ii) structuring the problem further with a focus on connections between the concepts. Phase (i) can be conducted flexibly with survey techniques or individual interviews, combined with numerical analysis (e.g., Hahn and Ahn, 2005), while phase (ii) requires facilitated modelling (see Franco and Montibeller, 2010) in a smaller group setting, with the aid of cognitive mapping or one of its several variations such as causal mapping or reasoning maps (e.g., Eden, 1988; Eden et al., 1992; Ozesmi and Ozesmi, 2004; Siau and Tan, 2005; Montibeller and Belton, 2006; Montibeller et al., 2008).

Phase (i) contains the demanding task of how to combine individually collected information about concepts into a joint concept list, and how to derive an overall importance of those concepts as kind of a "compromise weight" (Wei et al., 2000). Because of the known cognitive discrepancies of respondents, namely imperfect memory, selective attention, as well as constrained satisfaction (Festinger, 1957; Simon et al., 2004), there is a reason to assume some importance for concepts that individual respondents simply forgot to mention. Therefore, ratings for non-overlapping items may be sought. Some methods for dealing with incomplete preference data already exist (e.g., Hahn and Ahn, 2005; Choi and Ahn, 2009; Choi and Bae, 2009), but there is a lack of procedures explicitly suitable for large-scale open-ended concept queries. One solution to combine individually collected concepts and, further on, their individual valuations to a unified preference information, is a semi-automatic stochastic simulation of joint preferences from partially overlapping individual concept lists and preference ratings. In Sironen et al. (2013), uniform distributions with different distributional assumptions using the 3-CM method were used to generate missing preferences and produce a random realisation for these values. Assumptions were tested with a dataset provided by expert interviewees, in the case of compiling cultural sustainability indicators in order to compare bioenergy production chains in eastern Finland.

One of the most obvious results from combining preference information with missing preferences, by generating them under different distributional assumptions, was that the first assumption of experts being able to define all the items they consider relevant did not hold. In Sironen et al. (2013), the experts did not consider the new items that were originally missing from their concept lists less important; this indicates the existence of cognitive biases (Festinger, 1957; Simon et al., 2004. The experts may not know all the relevant items at first in a complex decision problem. The 3-CM method, with simulation of stochastic preferences, contributes particularly to planning processes in which the democratic participation of a large number of stakeholders is needed in the goal-setting phase.

3-CM method for defining and ranking selection criteria of initiatives of TESS

Selection and classification of TESS initiatives are the main task of WP1. Often, decision criteria are adopted from literature or some other indicator lists, but no universally accepted criteria for the selection of innovative, sustainable community-based initiatives are available. The 3-CM method is utilised in defining the selection criteria of TESS study cases and the classification of them into key and supportive categories. A response is first called for by 4-8 active TESS actors/experts in all partner countries – 30-40 respondents altogether. All respondents are asked individually, in a relatively unstructured way, to try to elicit their thoughts and understandings about the objectives of the TESS case initiatives. From this questionnaire cognitive maps can be drawn to help each individual refine their thinking. Cognitive mapping is done by using, e.g., Decision Explorer program.

A joint cognitive map will serve as a starting point in discussions towards criteria used in case selection. Individual objectives of the respondents are combined into a composite map that represents the beliefs of a whole consortium, which result from the fact that not all of the experts have defined and evaluated the same items. Initially, the map may contain several concepts. Similar concepts can be merged into one, while maintaining a balance of concepts from all members of the group. To make the map manageable, the concepts are arranged into clusters containing 1-m concepts. The final merged map is an overview map at the

cluster level, showing links between each cluster. This map can serve as a focus for following discussions.

Respondents are also asked to rate objectives with an application of SMART (e.g., von Winterfeldt and Edwards, 1986), by directly rating each of the items in their concept list in turn. The respondents are requested to first select the most relevant item when considering the initiatives, and assign 100 points to that particular item. Next, the experts are asked to rank the other items correspondingly on the numerical scale from 0 to 100, including the possibility of assigning the same value to several items.

However, usually not all the experts define the exact same items; thus, there exist missing objectives. Therefore, the inquiry for TESS partners will potentially include a 3-CM cognitive mapping task with simulation of stochastic preferences (Kearney and Kaplan, 1997, Sironen et al., 2013), in order to analyse and describe overall conceptioning among the group. In the procedure, the ratings for non-overlapping items are generated by assuming probability distribution for the missing values, and producing a random realisation for those values. The usage of the 3-CM method will be pre-tested in this context before being applied.

Benefits/Drawbacks of 3-CM-method

+ Effective way of looking for holistic solutions and generation of ideas
+ More versatile information can be obtained compared to information obtained through more structured questioning
+ Can be perceived as less threatening than direct questioning
+ Can provide results accurate enough to replace the second-phase interviews needed to combine the different numerical expert judgments or concept lists
- Is usually time consuming.
- Requires a skilful facilitator.
- Some participants may find it difficult to express their preferences.

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Appendix 3. *Snowball Sampling*[1][2][3]

Maria Caterina Bramati

Snowball sampling is a method typically used with unknown or rare populations. Members of these populations have not all been previously identified and are more difficult to locate or contact than known populations (Coleman, 1958; Goodman, 1961; Spreen, 1992). Obtaining a sample from such a population typically does not allow for the use of traditional random sampling methodologies requiring that the entire population be known. Instead, methodologies such as snowball sampling employ the presumed social networks that exist between members of a target population to build a sample. Snowball sampling is more directed and purposeful than many other non-random sampling techniques, such as convenience sampling, which focuses only on the most easily identified and reachable members of a population. When carefully conducted, snowball sampling can provide comprehensive (though not generalisable) characterisations of unknown populations.

The snowball sampling process is relatively simple. In the same way that a snowball rolled in the snow will pick up more and more flakes with each turn, snowball sampling is a multi-step process in which more and more people are added to the sample with each step. Typically, the initial step involves identifying a group of individuals who are known members of the population, in order to create a "seed." Often, the seed comprises an existing list (or lists) of members of the population, but these lists tend to be fairly homogeneous, such as the members of a professional organisation.

Next, seeds are asked to elicit the names of up to three other individuals. The contacts provided by the seed produces the first wave of individuals, who in turn are contacted, thus providing the second wave. The outcome from contacting the second wave produces the third wave, which contributes to the fourth wave, and so on.

There are a number of parameters that need to be determined when designing snowball sampling, including:

- *Number of waves.* The number of waves may or may not be determined beforehand. Often, the process ends when the waves cease to produce a predetermined number of new contacts. In small populations, it may take only a few waves before almost no new contacts are obtained in a wave, whereas larger populations may require more waves. For example, in a study, the sampling can be considered complete when fewer than 3% of those contacted in a wave responded.

- *Number of contacts to request.* Often, the number of contacts asked for is three, partly to minimise the burden on the respondent but also to minimise the potentially biasing impact of participants with very large social networks.

[1] Erickson, B.H. (1979) 'Some problems of inference from chain data', Sociological Methodology, Vol. 10, pp. 276-302.

[2] Heckathorn, D.D. (1997) 'Respondent-driven sampling: A new approach to the study of hidden populations', Sociological Problems, Vol. 44, Suppl. 2, pp. 174-199.

[3] Faugier, J & M Sargeant (1997) 'Sampling hard to reach populations', *Journal of Advanced Nursing*, 26: 790-797.

- *Criteria for including a participant in the sample.* Usually, the number of times a person is identified by others as a member of a certain population is used as a selection criterion. For some populations, it is appropriate to include a participant after only one mention, while for others, it may require two or three mentions. For this study, we used self-confirmation as our criterion for inclusion: if participants identified themselves as low-carbon initiative leaders, we included them in the sample.

Advantages of Snowball Sampling

The primary advantage of snowball sampling is its success in identifying individuals from unknown (and potentially very large) populations beyond any known segments of the population. In the case of the population of low carbon initiatives, a random sample is not a possibility, and snowball sampling provided a way to identify initiatives who otherwise might not have been included in the sample. Another advantage is that a sample can be produced quickly and cost-effectively, particularly when it is completed on the Web. For our study, the costs to create the sample consisted of the time spent searching the Web, emailing potential initiators, and managing the contacts database. Contacting potential initiators via email could also significantly reduce individual response times, as well as the time needed between contacts.

Challenges of Snowball Sampling

There are several challenges inherent in snowball sampling, the foremost being that snowball sampling does not yield a random sample. Thus, the results from a study using a snowball sample are not easily generalisable for the population under study. However, when a population is unknown and there is little information available about it, snowball sampling can provide a better understanding and more complete characterisation of a population. Also, recent contributions allow for certain inferences using data from network samples (see Handcock and Gile, 2010). In the case of low carbon initiatives, the few studies that have been conducted focused only on known segments of the population. One of the goals of this study was to reach as diverse an array of initiatives as possible, including those who may have been excluded from previous studies, and snowball sampling provided a means to achieve this.

Biases

Snowball sampling does not produce a random sample because of the potential biases present in the process. The initial seed may introduce bias at the beginning, because the people who make up the seed are typically selected via a convenience sample. Volunteerism bias frequently exists, both in the seed and also in subsequent waves. Masking is also common in at-risk or stigmatised populations (i.e., drug users, people with HIV), where people may not want to reveal that their acquaintances are members of that population, though masking can occur in any population. Additionally, personal network size influences the chances that a person will be included in the sample. Members of the population with the largest networks and highest social visibility are more likely to be referred (Biernacki and Waldorf, 1981; Henslin, 1972). Conversely, those with small networks, or isolated individuals, can be omitted from the sample because they are less likely to be mentioned by another member of the population (Van Meter, 1990).

Minimising Biases

Some of these biases can be minimised, though not entirely removed, by taking a few extra steps suggested in the literature, such as:

- *Obtaining a large sample size* (Atkinson and Flint, 2001; Tsvetovat and Sharabati, 2006).
- *Relying on a variety of indirect sources to develop a seed* (Blanken and others, 1992; Faugier and Sargeant, 1997). By conducting a Web search and contacting public and private organisations/institutions, the sample can be built from many different sources. Based on the results from the snowball sampling and the survey, a very diverse group of initiatives can be reached from all target sectors involved in those activities.
- *Reaching isolated members of the population.* This issue can be addressed by creating a new list of potential users through a Web search, and by requesting contact information for only three users, to avoid biasing the sample towards people with large personal networks.

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Appendix 4. WP1 Questionnaire

Charles Henderson

Snowball Questions

1. Please name three similar initiatives that you are aware of in your region (NAME) but do not collaborate with. TEXT BOX WITH THREE ANSWERS POSSIBLE.
2. Please name all the other 'green' initiatives that you collaborate with, *e.g., share resources, ideas, on a regular basis.* TEXT BOX WITH MULTIPLE ANSWERS POSSIBLE, I.E., WITH + OPTION.

All these initiatives should be contacted as per questionnaire guidelines.

About the Initiative

3. What is the official name of the initiative? TEXT BOX

4. In what year was the initiative founded? (Please provide a start year). NUMBER BOX

5. Is the initiative active? YES/NO + NUMBER BOX
    a) Yes
    b) No
    If no, please provide end year.

6. Which of the following domains is the initiative active in? Please select as many answers as are relevant to you. MULTIPLE CHOICE + TEXT BOX FOR OTHER
    a) Energy
    b) Food
    c) Transport
    d) Waste
    e) Other
    Please specify, e.g., water, health, spirituality, tourism.

7. Please provide more detail about activities of the initiative in each of the domains you have selected.
    TEXT BOXES x 5

8. What are the three main goals/mission of your initiative? MULTIPLE CHOICE / TEXT BOX FOR OTHER
    a) Community regeneration
    b) Enhancing community cohesion
    c) Creating employment
    d) Reducing climate impacts
    e) Developing a self-reliant community
    f) Improving the local environment
    g) Other
    Please specify

9. Which of the following best capture the formal status of the initiative? Please select as many answers as are relevant to you. MULTIPLE CHOICE + TEXT BOX FOR OTHER
    a) Co-operative
    b) Community interest company
    c) Ltd company
    d) Charity
    e) No formal constitution

f) Other, please specify.

Size of Initiative

10. What is the scale of the initiative? Is it operating within...SINGLE CHOICE+ TEXT BOX
    a) a neighbourhood *i.e., just a street or estate*
    b) a district *i.e., a village or an area within a town or city*
    c) a regional administrative area *i.e., a local authority area or unified regions*
    d) Other
    Please specify.

11. What is the name of the region covered by the initiative if it can be defined (i.e., the neighbourhood, district, regional administrative area)? e.g., Rome, Metro Barcelona, Scotland. TEXT BOX FOR NAME

12. i. Can you estimate the size of area that the initiative operates within? NUMBER BOX + DROP DOWN MENU WITH METRIC OPTIONS
    e.g., n*umber and metric e.g., 10 hectares, 3km*^{2}

    ii. What is the population or number of households living in your initiative area, if available? NUMBER BOX + DROP DOWN MENU WITH METRIC OPTIONS.

13. Can you estimate how many people directly benefit from the initiative per domain? NUMBER BOX + DROP DOWN MENU TO SPLIT TOFOUR DOMAIN OPTIONS (+OTHER)
    e.g., receiving food, implementing energy reduction, projects organised by the initiative (list categories if necessary).

14. How many people do you envisage will benefit from your initiative in 12 months time? NUMBER BOX + DROP DOWN MENU TO SPLIT TO FOUR DOMAIN OPTIONS (+OTHER)

    a) More than present
    b) Less than present
    c) Same as present

15. How many official members are signed up to this initiative, e.g., signatories to project objectives? NUMBER BOX
    If numbers differ from answer provided in Q11.

How it is supported and managed

16. Was the initiative created by one person / a small group of people in the community? YES/NO + TEXT BOX
    a) Yes
    b) No
    If 'No', please provide details of how it emerged (for instance, municipality-sponsored, state-created, private sector-generated).

17. Is the initiative part of a wider group of initiatives? e.g., Transition Network YES/NO + TEXT BOX
    a) Yes
    Please specify.

b) No

18. How is the initiative funded? Please choose any answers that apply. MULTIPLE CHOICE + TEXT BOX FOR OTHER
    a) Grants from funding bodies
    b) Self-funded by members
    c) Local enterprise
    d) Central government
    e) Local government
    f) Private donations
    g) Sale of products/services provided by your initiative
    h) Other
    Please provide other source of funding

19. How many people does the initiative employ? Please provide number in FTE (Full Time Equivalents). NUMBER BOX

20. How many people volunteer their time regularly to support the initiative? Please provide number in FTE (Full Time Equivalents). NUMBER BOX

Tracking Progress

21. Part of our project is hoping to better understand the environmental impact of each initiative in regards to carbon reduction. Are you able to provide data for Carbon Dioxide (CO_2)/Greenhouse Gas accounting? YES/NO + TEXT BOX
    a) Yes
    Please provide details, e.g., what kind of emissions data are you able to provide? What does it include? How many years of data are you able to provide?
    b) No

About you

22. Please can you provide contact details for you or an alternative representative person for the initiative?
    a. Name, Surname, Role within the initiative, E-mail, Contact number, Postal address, Initiative website (if available). TEXT BOXES
    b. Please provide E-mail, Phone Number, Postal address for the initiative if different from above.TEXT BOXES

23. May we publish the name of your initiative and details of its activities, location and URL on our web platform? YES/NO
    a) Yes
    b) No

Appendix 5. *The Voting Task of Selection Criteria of Key Initiatives.*

Dear colleague,

Thank you for your assistance in participating in this key initiative criteria selection procedure!

Your answers will help us to construct a joint understanding towards selection criteria of key initiatives within the consortium.

We are approaching the choice of selection criteria of the key initiatives. This will be done by voting. In voting, every partner organisation chooses the ten most suitable criteria for selection of key initiatives**. In the voting, you should focus** on the relevance of criteria from the view of the research questions of TESS. Just to remind, objectives of research-oriented WPs are as follows.

- WP2 objectives
    - To develop MRV methodology
    - To identify innovative practices
    - To assess potential contribution of initiatives
- WP3 objectives
    - To identify successful initiatives
    - To identify success factors
    - To provide initial recommendations for transition strategies
- WP 4 objectives
    - To estimate aggregate impacts of the initiatives
    - To identify supportive policy environments

Please answer the questions in the Excel sheet. When answering, you must choose **a maximum of 10 selection criteria of key initiatives** from the criteria list. When selecting the criteria, consider which are the most important and useful criteria **according to their relevance to the research questions of the Work Package(s) above**. This mail has been sent only to you, as a representative of your team. If necessary, you can make decisions together with your team members, and then send one collective answer from your team.

In the Excel sheet, there is room also for your proposals for new criteria and for your clarifying comments on the criteria.

On completion, please return the fulfilled Excel document to OUAS (arto.haara@oamk.fi). If you have any questions, please do not hesitate to contact us.

NOTE: The **absolute deadline** for sending back your answers is next Wednesday **21th May**.

Remember: Even when there are no certain data collected for a criterion in this phase of the study, expert judgments might be applied in the selection procedure, based on existent data and your expert knowledge.

Appendix 6. *The Ranking Task And the Framework for It.*

Dear colleagues,

It is finally time to select key initiatives for the TESS studies!

Please give your proposal for two key initiatives from your country according to the following procedure. Propose two optional ones also, which might be needed in order to get a balanced criteria set as a whole. You should send your proposal to arto.haara@oamk.fi no later than **9.6.2014**.

1. Finalise the evaluation table (both numerical and verbal evaluations) properly with your team of experts (attachment). (Size and duration are not in the evaluation table because they will be used when evaluating the whole key initiative set, aiming to get both small and big initiatives, as well as new and long-standing ones.)

2. Which are your two proposals for the key initiatives from your country, according to the evaluations? Give also your verbal arguments supporting your proposal, if these are not ranked in the top two.

3. Make sure that those two initiatives are capable to serve as key initiatives of TESS (i.e., that they are willing to support our intervention and can provide us with access to the relevant data)

4. Propose two optional initiatives also, following ranking order as much as possible, which are different to your original two initiatives in terms of size and duration. Write averbal description of the procedure followed here, e.g., how well the proposal follows ranking order, and how willing you are to exchange an initiative from your original proposal with another of these options.

5. Send evaluation data with verbal arguments to Arto **by 9 June**.

If you have any questions related to the procedure above, or to the attached data sheet, please do not hesitate to ask.

	Criteria weight:	5		5		
	Scaled weight:	0,25		0,25		
		Criteria 1	Description	Criteria 2	Description	
	Criteria:	Community based	The initiative has, from the beginning, clearly been grassroot based and is supporting communities of citizens.	Value base	The initiative has underlying "green" motivation towards sustainability	
InitiativeID	Initiative name	Evaluation	Verbal arguments	Evaluation	Verbal arguments	
5		5		5		
0,25		0,25		0,25		
Criteria 3	Description	Criteria 4	Description	Criteria 5	Description	
Environmental impacts	The initiative has very likelyhad essential positive impacts on environmental processes (e.g. reduction of energy consumption, waste reduction, support of multiple use of natural resources instead of intensive use)	Carbon reduction	It is very likely that the initiative essentially reduces carbon emissions	External relations/Networking	The Initiative has essential positive influence on it´s surroundings, on other initiatives and/or is activily networking.	
Evaluation	Verbal arguments	Evaluation	Verbal arguments	Evaluation	Verbal arguments	Other comments on evaluation of the criteria