INTELLIGENT ENERGY EUROPE

*Project no: IEE/10/224/SI2.593412*

*Rural Web Energy Network for Action*

# *eReNet*

# "D2.3 Identification of Local Needs and Priorities"

## REGEA

**June 2012**

eReNet

Project no: *IEE/10/224/SI2.593412*

# Rural Web Energy Network for Action (eReNet)

**Start date of project:** 21/06/2011

**Duration:** 30 months

**Deliverable:**

"D2.3 Identification of Local Needs and Priorities"

**Lead Contractor for this Deliverable:**

REGEA

This deliverable has been developed by REGEA project team, in close collaboration with NTUA. The authors wish to thank all the eReNet partners, who have provided feedback and helped to elaborate the final version of this document.

**June 2012**

## Preface

This report is prepared within the framework of the eReNet – Rural Web Energy Learning Network for Action (IEE/10/224/SI2.593412), supported by Intelligent Energy Europe. eReNet aims to add value to local actions in rural communities, creating an intelligent and integrated "Rural Web Energy Learning Network for Action". eReNet will foster rural communities in the development, implementation and monitoring of their Sustainable Energy Action Plans (SEAPs), capacity building of the related actors through knowledge transfer from experienced communities.

## Project Partners

| N° | Participant name | Short Name | Country |
|---|---|---|---|
| **CO 1** | National Technical University of Athens | NTUA | Greece |
| **CB 2** | Energy Agency Upper Styria | EAO | Austria |
| **CB 3** | North - West Croatia Regional Energy Agency | REGEA | Croatia |
| **CB 4** | Black Sea Energy Research Centre | BSERC | Bulgaria |
| **CB 5** | IrRADIARE, Ltd | IrRADIARE | Portugal |
| **CB 6** | Municipality of Amyntaio | AMYNTAIO | Greece |
| **CB 7** | Town of Neumarkt (in the Upper Palatinate) | NEUMARKT | Germany |
| **CB 8** | Asenovgrad Municipality | ASENOVGRAD | Bulgaria |
| **CB 9** | Municipality of Judenburg | JUDENBURG | Austria |
| **CB 10** | Sertã City Council | CM SERTÃ | Portugal |

# Table of Contents

*The recorded materials from the Consultation e-Meetings are available in the folder "WP2_Deliverables\D2.3 Identification of Local Needs and Priorities\Recorded material".*

# 1. Introduction

Based on the questionnaires' results (D2.2: Survey Results from Sustainable Energy Activities at a Local Level), an assessment of the rural communities' local needs and priorities takes place in this deliverable, so as to identify the parameters for rural communities that should be taken into special consideration during the development of their Sustainable Energy Action Plans (SEAPs).

To this end, the triple helix rational adopted, namely the close collaboration among academia, energy agencies and regional municipalities participating in the consortium, have worked together, in order to identify the specific characteristics that differentiate the rural communities from the communities for which the SEAP methodologies and tools have been developed in the past under other Intelligent Energy Europe (IEE) initiatives (MODEL, MUSEC, PEPESEC, etc).

The activities under this deliverable are listed below:

- Identification of the available technological know-how in the rural regions on up to date RES and RUE technologies;
- Identification of energy resources available for further exploitation;
- Determination of the needs and prospects for the future development of the rural communities based on the above activities;
- Short review of all existing tools and methodologies for the implementation of SEAPs;
- Specification of the key differentiation parameters of the rural communities, based on their identified needs and prospects, adopting the triple helix approach (academia, energy agencies, regional municipalities);
- Customization of existing tools and methodologies in order to fit rural municipalities' characteristics;
- Realization of e-consultation meetings for the discussion of the customized methodology for rural municipalities.

# 2. Identification of Rural Communities Characteristics

## 2.1 eReNet Communities' Characteristics

Local communities involved in eReNet have different characteristics, needs, sizes and capacities. Almost all of them have limited financial and technical resources for preparation of complex plans for sustainable energy development and implementation of identified projects. The methodology for SEAP's preparation is relatively complicated and should be adapted to smaller local communities, especially rural.

In D2.2 "Survey Results from Sustainable Energy Activities at the Local Level" detailed survey results from sustainable energy activities at a local level have been presented for the following 6 municipalities:

- Judenburg – Austria;
- Asenovgrad – Bulgaria;
- Amyntaio – Greece;
- Sertã – Portugal;
- Sveta Nedelja – Croatia;
- Dugo Selo – Croatia.

The main objective of this chapter is to identify parameters for rural communities based on survey results for 5 key stakeholders groups:

- Group 1: National, regional, municipal institutions;
- Group 2: Schools, universities and citizens;
- Group 3: Farmers and agricultural producers;
- Group 4: Energy agencies, utilities and energy companies;
- Group 5: Planners, developers.

A short description of the survey results for each eReNet rural community is presented below:

*Municipality of Judenburg*

In terms of ongoing activities in RES and RUE field, the conducted poll shows a general satisfaction of the relevant stakeholders in Judenburg. These results reveal a process of systematic energy management that represents the basis of sustainable development.

However, as the main responsible for the promotion of sustainable energy, the raising awareness still shows potential for improvement, for example on the use of

the radio or information points. Above all, television and city news are recognized as the most decisive media for dissemination in all target groups. In this context, the lack of knowledge of the local population on the impact of RES and RUE projects has to be built for lifelong learning in general and especially in environmental education.

Concerning barriers for sustainable energy development in Judenburg, there is a significant lack of financing instruments and budgets in the perception of all stakeholders' groups. Despite the fact that the provincial support of RES projects, like solar thermal and photovoltaic installations are the best known, they have not yet produced the desirable results. The existing financing instruments should be better promoted or/and there should be more direct service offers to help the inhabitants and companies in applying for these subsidies.

In general, different groups of stakeholders in Judenburg are aware of sustainable energy development and environmental preservation as a secure and progressive instrument for local economic development and life quality improvement.

*Municipality of Asenovgrad*

Raising public awareness on RES and RUE technologies is considered one of the main prerequisites for sustainable energy development in Asenovgrad, as most of the citizens are not acquainted with these particular issues.

Recommendations on raising citizens' awareness include the implementation of demonstration projects and the regular organization of workshops, seminars and information days. Moreover opportunities to achieve this goal should also be sought through energy education, as the existing efforts on the local level are considered mostly average.

The Municipality of Asenovgrad should present more results to the citizens in order to teach them how to consume more efficiently, to organize learning campaigns, to develop a strategy for stimulating people to use more renewable energy, to attract third-parties for co-financing of projects for energy efficiency measures in public buildings, the municipality to give a shiny example how to use solar collectors for hot water, PV and also to explore the RES potential in the community.

Utilization of more local energy resources will give Municipality of Asenovgrad ability to face the challenges of the climate change.

*Municipality of Dugo Selo & Municipality of Sveta Nedelja*

According to the survey results, community sustainable energy development and lifelong learning activities are either scarce or go unnoticed. Knowledge on existing RES/RUE project financing possibilities is very low. Barriers to sustainable energy development and lifelong learning are numerous and significant, and in order to improve momentarily the situation it is necessary to activate more actors like

citizens, investors, manufacturers, schools, universities, utilities and youth.

Although the responsibility for dissemination of RES & RUE related information belongs to a number of stakeholders, the main responsible to tackle this obstacle is the local administration. Recommendations on raising citizens' awareness include the promotion of sustainable energy planning and related energy learning actions through information channels that seem to be quite neglected at the moment (television, special promotional events, information points in shopping centres and other public places, magazines/letters for citizens or official gazettes from the municipality, etc).

In general, the development of RES and RUE projects in Croatia is quite limited compared to the country's existing potential since a lot of barriers have to be overcome for successful implementation.

*Municipality of Amyntaio*

In general, the awareness level by the majority of the stakeholders is rather low compared to the activities regarding strategic energy planning and links with other communities realized so far, and this is basically attributed to the fact that the municipality doesn't follow an aggressive strategy on the dissemination of information regarding RES/RUE activities.

The higher capital cost of energy technologies compared with conventional energy technologies and the anti-learning culture in the community are considered to be the main barriers towards sustainable energy development.

In this context, the community should focus its efforts on informing and training the citizens on the benefits of RES and RUE technologies for the region and the citizens themselves, also perhaps through demonstrative efforts or giving the good example where possible. Certain fiscal incentives could also improve the situation.

*Municipality of Sertã*

In the municipality of Sertã, there is, also, detected generally lack of knowledge in terms of sustainable energy development. In this context, there is still lot to be done regarding initiation of activities and/or boosting their visibility to all the relevant stakeholders.

According to the survey results, all the stakeholders agree that the most important barriers are significantly higher costs of RES/RUE energy technologies in comparison with conventional energy technologies, unawareness of the state-of-the-art technologies, and potential benefits of these technologies as well as lack of opportunities.

In this same direction, local media (television, radio, press and internet pages) can

be used as dissemination channels for the promotion of actions and initiatives towards sustainable development.

The most important contribution to lifelong learning actions is expected from local authorities, regional energy agencies and citizens.

The conclusions of survey results per surveyed issue are the following:

- If satisfaction with the activities is considered to represent a "summa summarum" of past and present community activities regarding sustainable energy development and lifelong learning, and a basis that future activities will build upon, it seems that the Municipality of Judenburg has the best "starting point". On the other hand, in Dugo Selo and Sveta Nedelja, most activities are yet to be undertaken or significantly improved. The other municipalities are somewhere in between, depending on the particular activity and stakeholder group;
- Findings concerning the status of sustainable energy development and lifelong learning activities suggest that in most of the communities surveyed a lot is still to be done regarding initiation of activities and/or boosting their visibility to all the relevant stakeholders;
- Generally, it looks that sustainable energy planning and energy learning actions are most actively promoted in the Municipality of Judenburg. In all other communities, there is a broad need for improvement regarding the use of all the promotion channels. However, differences between stakeholders warn that promotion should be sensitive to the needs and interests of a particular stakeholder;
- Summing up the results on the stakeholders' contribution to sustainable energy planning and lifelong learning actions, it seems that "Regional energy agencies" is by far the most distinguished actor. Contribution of all other stakeholders is highly context–specific and dependent on the specific perspective of an evaluating stakeholder;
- In all the municipalities, except in Judenburg, important barriers to sustainable energy development and lifelong learning seem to be quite numerous. A further examination is needed in order to establish action priorities needed for their alleviation in a specific municipal context;
- It seems that further negotiation is needed if an agreement is to be achieved regarding a balance of criteria that are momentarily put forward by different stakeholders "camps". It is interesting that the same stakeholders advocate opposite criteria in different communities, but further analysis is needed to determine whether the differences are the result of local context, specific interests, recruiting specificities or some other influences;

- It seems that further discussion on priorities between the stakeholders is needed in all the municipalities to avoid possible clash of initiatives coming from various stakeholders, and to focus financial and human resources to crucial efforts;
- Raising awareness on the issue is undoubtedly among the tasks of highest priority, since almost no activity in the field of sustainable energy development can be "sustainable" – at least in the long run – if it is based exclusively on "good will", altruism and one's own financial potential;
- Variability in expressed preferences, both between the municipalities and between the stakeholders warns that no general "recipe" exists; communication on sustainable energy development should be context–specific and susceptible to needs and interests of particular stakeholder;
- While the differences between the municipalities are to be expected, since the relevance of particular technology is dependent of land resources and climatic characteristics of particular community, wide discrepancies between the stakeholders from the same municipality are more problematic, since they point to unsatisfactory familiarity with particular technology or, perhaps, to specific interests that is not necessary in accordance with "common good".

## 2.2 Needs for Rural Communities

Although surveyed results, as can be expected, are generally different from municipality to municipality, there are some common moments. Rising public awareness through continuous promotional, informative and educational measures and activities are definitely one of the most important parameters and priority for sustainable development of all surveyed municipalities. Accordingly, rising public awareness will be given deserved attention as most important priority for RES/RUE development in rural municipalities.

More analytically, the main issues regarding sustainable energy development in rural communities are the following:

- Satisfaction with community activities regarding sustainable energy development and lifelong learning;
- Status of sustainable energy development and lifelong learning activities;
- Means of promoting sustainable energy planning and energy learning actions;
- Stakeholders' contribution to sustainable energy planning;
- Stakeholders' contribution to lifelong learning actions;
- Main barriers to sustainable energy development and lifelong learning;
- Criteria concerning the implementation of sustainable energy options;
- Priorities among community sustainable energy initiatives;

- Familiarity with existing RES/RUE project financing possibilities;
- Importance of various modes of communication on sustainable energy development;
- Assessment of benefits from various technologies.

In addition, the main properties of the key stakeholders groups can be summarized as follows:

- *National regional and municipal institutions* have a crucial role in planning and implementing sustainable development in rural communities. In all municipalities they recognize their role and find themselves a key stakeholder in this context. At the same time they are also faced with numerous barriers to sustainable development, confronted with lack of knowledge regarding gaining additional financial sources and generally unsatisfied with the community activities that have been performed to date. Moreover, it is important to emphasize that this group of stakeholders considers environmental criteria especially important for the implementation of sustainable development options with regards to economic criteria.
- *Group of Schools, universities and citizens* find implementation of sustainable energy and lifelong learning activities in each community of high importance and are generally interested in this subject. Also level of stakeholder satisfaction with communities activities depend on the particular municipality. Regarding means of communication and promotion, they should be chosen and adjusted to each municipality needs.
- *Farmers and agricultural producers'* perception is that are numerous barriers for implementing sustainable energy development options and generally are not introduced with benefits of using biomass. In this context they should be more stimulated through different municipality specific means of promotion in this context. It is also of crucial importance to introduce them to additional financing possibilities for biomass exploitation especially due to the fact that they currently are not familiar with existing options.
- *Energy agencies, utilities and energy companies* perceive numerous barriers in all rural municipalities that are restricting sustainable development. They put special emphasis to economic criteria for implementation for sustainable options before environmental which is opposite from National, regional and municipal institutions that find environmental criteria the most important. In this context agreement between these two groups is crucial. Also this stakeholders' group shows in general low familiarity with usage of additional financing tools for sustainable energy projects which is especially important for this expert group to be informed.

- *Group Planners and developers* in all the municipalities consider that all the sustainable development and lifelong learning activities should be a priority but at the same time there are significant barriers for their implementation. They show significant dissatisfaction with currently performed activities and economic criteria the most important for their implementation.

## 2.3 Priorities for Rural Communities

Rural communities possess a significant potential for RES/RUE projects implementation in order to proceed towards energy sustainability. However, it seems that this underlying potential remains largely unexploited. Based on survey results, as well as on experience of energy sustainable municipalities in Europe, main priorities of rural communities as prerequisites for their sustainable energy development are the following:

- Continuous promotional, informative and educational measures and activities - lifelong learning actions;
- Political commitment and establishment of organizational structure in municipality administration for sustainable energy development;
- Involvement of stakeholders;
- Sustainable energy planning;
- Identification of financial instruments for RES/RUE projects implementation;
- Introduction of the system for monitoring of energy consumption and indicators on the territory of municipality.

*Continuous promotional, informative and educational measures and activities - lifelong learning actions*

As it was already mentioned in the previous chapter, all surveyed municipalities are in significant need of continuous promotional, informative and educational measures and activities.

There is a significant lack of knowledge regarding sustainable energy development in rural municipalities. In the municipality of Judenburg sustainable energy planning and energy learning actions are most actively promoted. In all other communities (Asenovgrad, Dugo Selo, Sveta Nedelja, Amyntaio and Sertã), there is a broad need for improvement regarding the use of all the promotion channels. However, differences between stakeholders warn that promotion should be sensitive to the needs and interests of a particular stakeholder.

In this framework, basic aim of this section is to give an overview of all measures the implementation of which would result in raising public awareness. The proposed

promotional, informative and educational measures and activities are divided into the following three groups:

- *Promotional, informative and educational measures and activities in building sector* should include the following measures:
    1. Opening Energy Efficiency (EE) Info Centers in municipalities;
    2. Setting up EE info showcases in different parts of the municipality,
    3. Continuous informing of consumers on the possible manners of energy savings and current energy topics along with the energy bills;
    4. Implementation of thematic promotional and informative campaigns to increase citizens' awareness of energy efficiency in buildings with the topics such as:
        - How to build an energy efficient house?;
        - Reconstruction of buildings on the principles of sustainable construction;
        - Energy certificate – consumption of energy as market category when buying, renting or reconstructing buildings;
        - Energy efficiency measures in households - thermostatic valves, solar systems for the preparation of consumable hot water, A+++ energy class appliances;
        - Energy efficiency marks – Why buy only A+++ energy class appliances?;
        - The "standby mode" also spends energy! – plugging out appliances after use;
        - Saving internal lighting;
        - Heating on biomass;
        - Solar collectors;
        - Wind energy;
        - Heat pumps;
        - Intelligent building – what is it?;
        - What is a low-energy (three-litre) house?;
        - What is a passive (one-litre) house?;
        - What is the "Factor 10"? etc.
    5. Organization of professional meetings in order to promote rational energy use and reduction of $CO_2$ emission:
        - Organization of conferences and seminars on a scientific and professional level on rational energy use, climatic changes and energy

strategy of the municipality in cooperation with educational and scientific institutions and agencies:

- Organization of counseling and cooperation of the representatives of municipality and regions on planned and achieved energy savings and use of energy efficiency measures.

6. Educational campaigns on the design, construction and use of buildings in sustainable energy manner for the target groups of citizens:
   - Organization of forums on energy efficiency in each rural community on energy efficiency;
   - How to save energy? – for pre-school and school children;
   - Activities in schools: competitions in writing essays or making drawings about climatic changes or energy saving, giving out prizes and organizing exhibitions of works;
   - Publishing children's picture books about energy efficiency;
   - Energy efficient devices – salespersons;
   - Principles of energy sustainable reconstructions of buildings – building contractors;
   - Chambers of crafts;
   - Educative projects, in cooperation with partners, within IEE Programme.
7. Supporting the education system:
   - Initiate the introduction of vocational subjects on the sustainable building and energy efficient measures for pupils of general and vocational schools in municipality;
   - Financially support pupils' and students' competition works which promote energy efficiency;
8. Stimulate energy efficient and sustainable constructions in architectural and urban planning and architectural competitions which are opened for the territory of the municipality:
   - Competitions for new constructions;
   - Competitions for renovation – reconstruction;
   - Introduce energy efficiency and sustainability as a category in public project tender documentation

- *Promotional, informative and educational measures and activities in transport sector:*

1. Campaign: Let's say YES to public transport!;

2. Promotion of car-sharing model for the increase of higher vehicle occupancy;
3. Educating about and training ecologically acceptable manner of driving (driving schools);
4. Promotion of alternative fuels' use;
5. Foundation of an informative and presentation center for citizens on the use of vehicles running on alternative fuels (electrical energy, natural gas, biofuels etc.) with the possibility of renting vehicles running on alternative fuels.

- *Promotional, informative and educational measures regarding RES utilization* in rural communities are really numerous and here will be mentioned only some of them according to the survey results. Proposed measures and activities are the following:

  1. Organization of different kinds of events addressing:
     - Wind parks construction;
     - Solar utilization: from solar collectors to photovoltaic technology;
     - Small hydro power plants construction;
     - Biomass exploitation;
  2. Supporting the education system:
     - Initiate the introduction of vocational subjects on the implementation of renewable energy sources for pupils of general and vocational schools in municipality;
     - Financially support pupils' and students' competition works which promote RES utilization.
  3. Organization of professional meetings in order to promote utilization of local energy resources:
     - Organization of conferences and seminars on a scientific and professional level on renewable energy sources, climatic changes and energy strategy of the municipality in cooperation with educational and scientific institutions and agencies:
     - Organization of counseling and cooperation of the representatives of municipality and regions on renewable energy sources and ecologically acceptable fuels;
  4. Educational campaigns on RES utilization energy for the target groups of citizens:
     - Organization of forums in each rural community on RES utilization;

- How to use RES? – for pre-school and school children;
- Activities in schools: competitions in writing essays or making drawings about RES utilization and climatic changes, giving out prizes and organizing exhibitions of works;
- Publishing children's picture books about RES;
- Principles of RES technologies – assemblers, salespersons, etc.;
- Chambers of crafts;
- Educative projects regarding RES within the IEE Programme.

- *Political commitment and establishment of organizational structure in municipality administration for sustainable energy development*

  One of the most important prerequisites for successful sustainable energy development in the municipality based on RES/RUE utilization is political will and commitment of the Mayor and the Municipal Council. First step in this direction was joining the CoM's initiative.

  Accession to the CoM shows a positive attitude of the entire Municipal Government towards the sustainable energy development but it is only the first step in the right direction. It is important for other steps to follow, the most important being the provision of human potential and necessary financial funds the return of which would be realized mostly through energy savings. The leading people of the Municipal Government are, since the very signing of the CoM, important subjects and have to be actively included in the implementation of the Programme. They, within their rights and authorities, are the ones who can and should give support in all stages of the implementation of the CoM process because only with their full support a quality and successful implementation of the SEAP by year 2020 is possible.

  The tasks of the Municipal Government in the realization of the SEAP are the following:

  - Successfully integrate the targets and measures of the SEAP in the complete strategy of the municipality;
  - Ensure professional staff for the implementation of energy savings, application of energy efficiency measures, renewable sources of energy and ecologically acceptable fuels;
  - Ensure financial funds for the implementation of measures,
  - Continuously monitor the realization of energy and financial savings;
  - Support the implementation of the measures through the entire period of the implementation of the SEAP till 2020;

- Ensure monitoring and reporting on the dynamics of the implementation of the Plan till 2020;
- Continuously inform citizens on the implementation of the SEAP;
- Ensure active participation of participants and citizens during the implementation of the SEAP;
- Get involved in the network of cities which signed the CoM in order to continuously exchange positive experiences and joint synergy in the development of sustainable energy areas of Europe.

Benefits from the successfully implemented procedure; development, implementation and monitoring of the SEAP are multiple for each municipality itself and its citizens, but also for the responsible Municipal Government which through the successful realization of the SEAP will accomplish the following:

- Demonstrate its strategic commitment for the sustainable energy development of municipality on the principles of the environment protection, rational energy government, application of the measures of energy efficiency, renewable energy sources and ecologically acceptable fuels as imperatives of sustainability in the 21st century;
- Set up the basis of sustainable energy development of municipality;
- Initiate new financial mechanisms for the initiation and implementation of measures of energy efficiency, use of renewable energy sources and ecologically acceptable fuels in municipality;
- Provide for a long-term secure energy supply of municipality;
- Increase the quality of life of its citizens (improve the quality of air, improve public transport, reduce traffic jams, etc.).

The first step is the identification of participants, and the next is the specification of their concrete roles and tasks in the procedure of preparation, development, implementation and monitoring of the SEAP. The procedure should be initiated by appointing a coordinator from the Municipal Government authorized to make all important decisions during development, implementation and monitoring of the SEAP.

It is important to stress that the development, implementation and monitoring of the realization of the municipality's SEAP is an exceptionally complicated task which will place many challenges before all its participants and the executive authorities of municipality. Even though the European Commission has given basic instructions for the entire course of the implementation, the Municipal Government has to, as much as possible, according to the local specificities; adjust to a concrete situation in the municipality which is not a simple task.

The main precondition of a successful realization is the development of an efficient organizational structure in which it will be known from the very beginning who, what, how and in which time period something should be done. The first step in the development of the organizational structure for the implementation is appointing a coordinator. Coordinator is the key person of the implementation of SEAP which from the beginning makes all the important decisions.

Although, in all 6 surveyed communities, one of the most important barriers is lack of professional staff, the proposal is to appoint the Energy Council, as advisory professional body responsible for sustainable energy development of municipality.

The Energy Council is an advisory professional body which has to be founded in the launching stage of the implementation of the SEAP with the goal of continuous professional monitoring the realization of the entire process, analysis of the results and quality application of new technologies. The proposal is for the coordinator of the SEAP's implementation to perform the role of the president of the Energy council as well. The Energy Council should be made of prominent scientific and professional experts.

Basic tasks of the Energy Council are the following:

- Monitoring all stages of the process; preparation, development, implementation and realization of individual elements of the SEAP;
- Monitoring and analysis of the results of the implementation of the SEAP, priority measures and activities;
- Review of the SEAP;
- Analysis of draft amendments to the SEAP and identified measures and activities;
- Participating in periodic reporting to Municipal Council and the public on the results of the development, implementation and monitoring of the realization of the SEAP;
- Analysis and review of the report on the achieved results of the implementation of the SEAP for the European Commission;
- Communication with the stakeholders and citizens of the implementation of the SEAP.

It is proposed that the Energy Council of each municipality appoints prominent energy experts with a long term experience in the fields of:

- Energy planning;
- Architecture, civil engineering and physical planning;

- Traffic and communal infrastructure.

The Coordinating Body for the implementation of the Action Plan, priority measures and activities is a working body of the City Office for Energy, Environment Protection and Sustainable Development primarily in charge of the preparation, initiation, operative coordination and implementation of concrete projects of energy savings, application of energy efficiency measures, renewable sources of energy and ecologically acceptable fuels and environment protection in accordance with the schedule and dynamics of the realization of the implementation of the Action Plan.

*Involvement of stakeholders*

Signing the CoM, the municipality committed to actively include citizens and civil society associations in the implementation of SEAP.

Directly or indirectly, all citizens would benefit from the successful development and implementation of SEAP which through representatives of various interest groups (participants) would participate in all stages of realization. Participation of the largest possible number of stakeholders is the initial step in the process of the change of energy attitudes and behavior of citizens.

Participants in the development and implementation of the SEAP should be everyone:

- Whose interests are in any way connected to the SEAP;
- Whose activities influence the Action Plan in any way;
- Whose property, access to information, sources, expertise etc. are necessary for a successful development and implementation of the SEAP.

As many interest groups – stakeholders as possible should be included in the process of development and implementation of the SEAP which requires an efficient communication strategy, the first step being their identification.

The proposed stakeholders from each municipality can be divided into the following categories:

- municipal offices, institutes and services;
- local government (municipal districts and local boards);
- municipal companies;
- craftsmen associations;
- entrepreneurs associations;
- association of employers;

- automobile clubs;
- schools and colleges;
- other educational and scientific institutions;
- non-governmental associations;
- consumers associations.

*Sustainable energy planning*

Sustainable energy planning is one of the most important preconditions for successful sustainable energy development of rural communities. It is important that SEAP of each municipality is completely harmonized with the relevant national legislative, but also with all official municipal documents, particularly Spatial plan of the municipality.

Furthermore, it is essential that SEAP for each municipality represents the real situation in municipality based on reliable data. SEAP should be municipal basic document which on the basis of the data collected on the detected situation identifies and gives precise and clear guidelines for the implementation of projects of energy saving, application of energy efficiency measures, renewable energy sources use and ecologically acceptable fuels on the municipal level which should result in the reduction of $CO_2$ emission in municipality of more than 20% by 2020.

The main targets of the development and implementation of the SEAP are:

- Reduce $CO_2$ emissions in all sectors by the implementation of the energy efficiency measures, use of renewable energy sources and ecologically acceptable fuels, rational energy management, continuous education and other measures;
- Contribute as much as possible to the safety and diversification of energy supply of a municipality;
- Reduce energy consumption in different consumption sectors in municipality;
- Enable the transformation of districts into ecologically sustainable areas.

The Action Plan focuses on long-term transformations of energy systems within municipalities and gives measurable targets and results related to rational energy management, reduction of energy consumption and $CO_2$ emission.

The obligations from the SEAP refer to the entire territory of the municipality, both public and private sector. The Action Plan has to comply with the institutional and legislative framework at the EU, national and local levels in all its segments and is adopted for the period till the year 2020.

The SEAP should be developed in accordance with the Handbook for the

Development of SEAPs by which the European Commission has prescribed the methodology, manner of development of the Plan in order to compare the achieved results among European cities.

The SEAP includes 10 main activities, in accordance with the prescribed methodology of the European Commission:

1. Determination of the time frame for the implementation of the Action Plan;
2. Classification of the energy consumption sector on the level of the municipality;
3. Analysis of energy consumption by sectors;
4. Determination of priority sectors of action in accordance with the analysis of energy consumption;
5. Development of $CO_2$ Emissions Baseline Inventory;
6. Development of the Plan of Measures and Activities for the achievement of the set targets of $CO_2$ emissions reduction by 2020;
7. Determination the dynamics of the SEAP implementation;
8. Determination of financing mechanisms of the implementation of the SEAP;
9. Determination of legislative frameworks for the implementation of the SEAP;
10. Setting targets of the energy consumption and associated $CO_2$ emissions reduction.

In the implementation stage of SEAP, each municipality should periodically report on the implementation and progress in fulfilling the set targets of the European Commission and for which purpose a special form was developed.

*Identification of financial instruments for RES/RUE projects implementation*

Each municipality has at its disposal significant sources to finance the suggested measures and activities in the form of national financing instruments as well as through various programmes of the European Union (see table below).

**Table 1.** Overview of possible sources of financing measures and activities

| Source of financing | Type | Maximum amount | Share in total expenses (%) | Year in which the funds are available |
|---|---|---|---|---|
| Municipal Budget | Own funds | - | 100 | 2012 |
| ESCO model | Own funds/ private capital | Different per country | 100 | 2012 |
| Banks | Credit | Different per country | Different per country | 2012 |
| National environmental | Grants/ credit | Different per country | Different per country | 2012 |

| | | | | |
|---|---|---|---|---|
| funds | | | | |
| IPA 1 Help in transition and strengthening institutions | Grants/own funds | Not defined | 85 | 2010-2013 |
| IPA 2 Cross-border cooperation Croatia- Slovenia | Grants/own funds | 300,000 Euro per project | 85 | 2010-2013 |
| Transnational Program for Southeast Europe | Grants/own funds | 206 M€ in total | 85 | 2007-2013 |
| CIP, IEE | Grants/own funds | 2.5 M€ per project | 75 | 2012 |
| FP 7, Cooperation | Grants/own funds | 32.4 M€ in total | 75 | 2007-2013 |
| CONCERTO | Grants/own funds | 150 M€ in total | 50-100 | 2007-2013 |
| Structural funds | Grants/own funds | 347.41 M€ in total | - | - |
| ELENA | Grants | 15 M€ per project | 100 | 2012 |
| WeBSEDFF | Credit/own funds | 6 M€ per project | 50-100 | 2012 |
| Open regional fund for OIE and EE | Grants/own funds | 400,000 € per project | 50-100 | 2008-2011 |
| "Energy Saving at Home" Program | Grants/loan | 15,000 per project | 15-75 | 2012 |
| Environmental subsidies of the state (including grants from EFRE, ELER, national and provincial funds) | Grants/own funds | - | Max 35 % | 2007 – 2013 (15) |
| KLIEN Klima- und Energiefonds (climate- and energy fund) | Grants/own funds | - | Max 35% for Investments | 2007 – 2013 (15) |
| Ökostromgesetz (Green electricity law) | Subsidized feed-in tariffs | 2,1 Mio (2012) | - | 2007 – 2013 (15) |
| Provincial funds for private house owners and dwellings for thermal insulation, biomass, thermal solar and PV | Grants/own funds/loans | - | Max. 25 % | 2007 – 2013 (15) |

| | | | | |
|---|---|---|---|---|
| QREN | EU funds | - | Max 70 % | 2007 – 2013 |
| Sistema de incentivos | EU funds | - | - | 2007 – 2013 |
| Fundo de eficiência energética | National Energy Agency (ADENE) | - | - | - |
| PRODER | EU funds | - | - | 2007 – 2013 (15) |

As it is different for each country in eReNet project, it is recommended for each municipality to prepare similar table in its SEAP.

*Introduction of the system for monitoring of energy consumption and indicators on the territory of municipality*

Continued monitoring, control and reporting on the achieved results are extremely important component of the process of preparation, implementation and monitoring the municipality's SEAP. All the cities which signed the CoM have the obligation to prepare and deliver to the European Commission a *Report on the Implementation of SEAP* (hereinafter referred to as: Report) every two years which with a detailed description of implemented measures and activities and achieved results should also include the so called Monitoring $CO_2$ Emission Inventory (MEI). Comparison between Baseline $CO_2$ Emission Inventory (BEI) and Monitoring $CO_2$ Emission Inventory (MEI) will unambiguously show what is the real reduction of $CO_2$ emissions in the municipality and give an answer to the question whether the implementation of the SEAP is successful or not.

It is a recommendation of the European Commission to prepare Monitoring $CO_2$ Emission Inventory (MEI) every two years. Should it be estimated that the creation of MEI every 2 years is a bit too demanding task after all, it is a recommendation of the European Commission to an alternation every 2 years prepare the *Action report* without the MEI (year 2, 6, 10, 14, etc) and the *Implementation report* with the MEI (year 4, 8, 12, 16, etc). The Action and Implementation reports will differ in as much as the first will give quality information on the implemented measures and activities, achieved energy savings and reductions of $CO_2$ emissions whereas in case of Implementation report the information be quantitative. Both reports have to include the analysis of dynamics and successfulness of the implementation of identified measures as well as suggestions of corrective measures for all those cases when the implementation of the measures resulted in executable or the expected results were not achieved. In order to create the report in a simpler way and to achieve comparability of the results, the European Commission prepared official forms for both types of reports.

Successful process of SEAP monitoring and control should at the same time take

place on several levels:

- Monitoring the dynamics of implementation of identified energy efficiency measures;
- Monitoring the successfulness of the implementation of projects according to the SEAP;
- Monitoring and control of set targets of energy savings for each individual measure within the SEAP;
- Monitoring and control of the accomplished reductions of $CO_2$ emissions for each measure according to the SEAP;
- Monitoring and control of set targets of energy savings for all identified measures within SEAP;
- Monitoring and control of the accomplished reductions of $CO_2$ emissions of for all identified measures within SEAP.

Creation of a successful methodology of monitoring and control of the implementation of SEAP is a complex task the first step of which is to define indicators, i.e. which parameters and in which way will be monitored. The table below gives a proposal of indicators by different categories and the manner of their control and monitoring according to recommendations and classification of the European Commission.

**Table 2.** Proposal of the Process of monitoring and control of the implementation of the SEAP

| CATEGORY | Indicator | DATA COLLECTION | MANNER OF MONITORING |
|---|---|---|---|
| TRAFFIC | Number of passengers in public transport in one year | 1 | Selection of representative bus and tram lines which will be monitored |
| | Number of kilometres of cycling tracks in the municipality | 1 | Statistical data |
| | Number of kilometres of pathways in the municipality | 1 | Statistical data |
| | Number of vehicles which pass a defined measuring point in a year/month (determining a representative measuring street/point) | 2 | Installation of a counter of vehicles in the chosen measuring point (street) |

| | | | |
|---|---|---|---|
| | Total energy consumption of vehicles owned by the municipality | 1 | Exact data from the fuel invoices converted into kWh |
| | Total energy consumption of alternative fuel vehicles in public transportation | 1 | Fuel invoices converted into kWh |
| | % of the citizens of municipality who are near and have good access to city public transportation | 3 | Surveying the citizens of the chosen parts of the municipality |
| | Average number of kilometres with big daily traffic jams | 2 | Analysis of the traffic flow in the chosen parts of the municipality |
| | Annual quantity of fossil and alternative fuels sold at the chosen petrol stations in different parts of the municipality | 1 | Agreement with the chosen petrol stations on the continues collection and delivery of data |
| **BUILDINGS** | % certified buildings in the municipality according to the Regulations on energy certification of buildings | 1 | Data from the Registry of certified buildings |
| | Total energy consumption in the buildings owned by the municipality per year | 1 | Exact data from the energy invoices converted into kWh |
| | Total area of installed solar collectors on the territory of municipality | 3 | Survey |
| | Total consumption of electrical energy in households in municipality | 3 | Electrical Utilities Data |
| | Total consumption of gas in households in municipality | 3 | Gas Utilities Data |
| **Production of energy from renewable sources** | Production of electrical energy from renewable sources on the territory of the municipality | 1 | Data from the National Register of privileged producers of electrical energy from RES |
| **Energy companies** | Number of companies registered for different energy activities, ESCO companies, producers and distributors of solar equipment, and others on the territory municipality | 2 | Register of business subjects at the Commercial Court |
| **Citizens** | Number of citizens of the | 1 | Organisation of 4 |

| | | | |
|---|---|---|---|
| | municipality who attend various energy happenings (public tribunes, workshops, seminars and so on) | | thematic workshops a year on energy efficiency, use of renewable sources of energy, sustainable construction and others) |
| **Sustainable public procurement** | Choice of a category of energy efficient products and services in the buildings owned by the municipality | 2 | Monitoring and control |

**1 - SIMPLE**
**2 – MEDIUM COMPLICATED**
**3 – COMPLICATED**

Each surveyed municipality should prepare similar table and chose indicators that, according to current situation in municipality, will show the successfulness of the implementation of the SEAP in the best way.

# 3. Review of Existing Methodologies & Tools

This section is dedicated to the review of existing methodologies and tools for the implementation of SEAPs, derived from a number of activities and mainly IEE co-financed projects. Data for the presentation of some of the methodologies (ENOVA, PEPESEC, BELIEF, MODEL, MOVING SUSTAINABLY, SECURE, MUSEC, ICLEI / NATURAL CAPITALISM SOLUTIONS, CLIMATE COMPASS, MINNESOTA PROJECT) are acquired through the JRC report "Existing Methodologies and Tools for the Development and Implementation of Sustainable Energy Action Plans (SEAP)" by Bertoldi P., Cayuela C., Monni S. and de Raveschoot R. (2010). Data for the rest of the presented methodologies are acquired through the projects' sites and outputs.

## 3.1 BELIEF

### Introduction

BELIEF is a European project co-financed by the European Commission under the IEE programme. In 2008, within its framework, BELIEF published the "Involve stakeholders and citizens in your local energy policy, Turn over a new LIEF" guide, containing a methodology on the preparation and implementation of an Action Plan.

### Basic Steps

The basic steps followed are presented below.

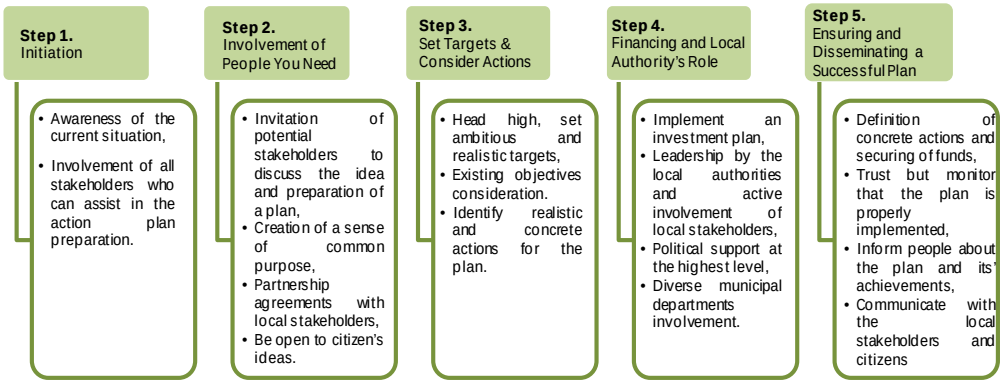


**Figure 1**. Basic Steps - BELIEF

### Evaluation

The BELIEF methodology's basic steps comprise the following:

**Table 3.** Strengths and Weaknesses - BELIEF

| Strengths | Weaknesses |
|---|---|
| • Comprehensive and detailed information regarding methods, towards the creation, | • Lack of guidance on gathering and monitoring data;<br>• Market segmentation has not been |

| | |
|---|---|
| implementation and organization of successful local energy communities;<br>• Wide range of shining examples easily adapted in other communities and adequate contact details;<br>• Focused approach on means towards gaining support from the stakeholders;<br>• Emphasis on the communication with the stakeholders and dissemination of the results. | included in order to achieve actor's differentiation;<br>• Insufficient development of substantial aspects, such as financial and project management. |

## 3.2 Climate Compass

### Introduction

Climate Compass is a methodology developed, in 2006, by the European City Network Climate Alliance, with the support of the European Commission, within the Co-operation Framework to promote Urban Sustainable Development. Main objective is to help local authorities get a climate change action plan up and running in the shortest time.

### Basic Steps

Within this framework the steps towards achieving the implementation of a climate change action plan are:

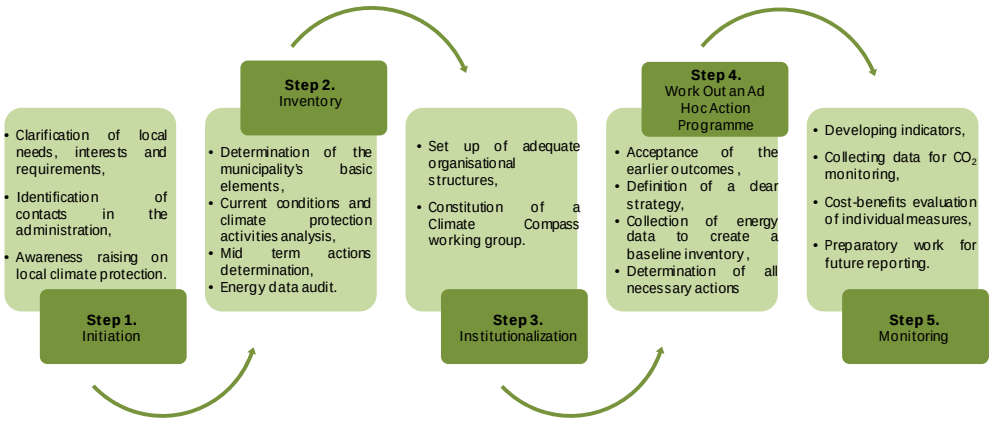


**Figure 2**. Basic Steps - Climate Compass

### Evaluation

The particular methodology's main strengths and weaknesses, as also highlighted by

the JRC study (2010) are presented below.

**Table 4.** Strengths and Weaknesses - Climate Compass

| Strengths | Weaknesses |
|---|---|
| • Offers a "Compendium of Measures" to carry out a climate change strategy at local level;<br>• Provides the possibility to choose a set of measures in the fields communities are more interested and decide the level of ambition;<br>• The inventory and monitoring of CO2 emissions are supported by the ECO2Region tool. | • Underdeveloped communication and dissemination aspects;<br>• Some helpful information is not available to general public;<br>• Characterized by focus and details regarding only the measures under implementation. |

## 3.3 COMBAT Report guidelines

### Introduction

In the framework of the EU-supported, CoM in the Central Baltic Capitals (COMBAT) project, four Baltic capitals, Helsinki, Riga, Stockholm and Tallinn, produced a set of guidelines related to the development and implementation of SEAP.

### Basic Steps

The guidelines include the following key topics:

- How stakeholders were involved during the process and how they will be involved in future and presents criteria for identifying important stakeholders;
- How cities calculated their emission inventories and how the required data was collected;
- How the measures for SEAP were selected, how the impact were assessed and how to plan short-term and long-term measures;
- How to monitor and evaluate the implementation and success of the measures.

### Evaluation

**Table 5.** Strengths and Weaknesses - COMBAT Report guidelines

| Strengths | Weaknesses |
|---|---|
| • These guidelines complement the manual on how to develop SEAP published by the CoMO; | • The small municipalities' characteristics have not been taken into consideration. |

- The COMBAT cities worked together on various issues, exchanging ideas and experiences.

## 3.4 CoMO's e-learning

### Introduction

The Covenant of Mayors Office (CoMO) produced an interactive learning opportunity for those wishing to deepen their technical knowledge of the CoM. The new e-learning material aims at building the capacity of both signatories and coordinators and guides them through their Covenant commitments – from SEAP planning to implementation.

### Basic Steps

The e-learning platform includes a series of seven interactive modules, which offer practical and inspiring examples, videos, case studies and self-assessment questions. Users are able to browse and learn at their own rhythm and improve their understanding of dedicated topics such as the elaboration of emission inventories, the development of SEAPs or the financing of actions.

### Evaluation

Because this tool is recently launched, the strengths and weaknesses cannot not yet be recorded. However, it should be highlighted that this tool is mainly targeted towards training of the stakeholders, and is considered rather supplementary to the existing SEAP methodology, rather than introducing a new/customized methodology.

## 3.5 Covenant capaCITY Training Platform

### Introduction

The 3-year project, "Capacity building of local governments to advance Local Climate and Energy Action – from planning to action to monitoring" (Covenant capaCITY), started in June 2011 and runs until May 2014. Covenant capaCITY takes up the urgent challenge to develop more sustainable energy communities (SEC) across Europe. This is done by offering a comprehensive European capacity building programme for local governments to support all the phases of implementing a SEAP (from motivation, planning, implementation, to monitoring and evaluating).

### Basic Steps

The programme deals with developing a new SEAP ("1st generation" SEAP) and provides ideas when reviewing existing SEAPs ("2nd generation" SEAP). It gives basic

guidance, offers ideas, hints, tips and tools - dealing with people, structures, processes for politicians and technical staff.

**Evaluation**

Among the strengths of tool is the extensive guidance for the SEAPs' development. Further strengths and weaknesses cannot be identified at this stage, since it is too early in the tool's development.

## 3.6 ENNEREG

**Introduction**

ENNEREG - Regions paving the way for a Sustainable Energy Europe is a European Project supported by the IEE Programme which started on May 2010 and runs until April 2013. It aims to establish and inspire EU Regions to take up the challenges of fulfilling the EU 20-20-20 climate and energy targets. 12 European regions will undertake SEAP and Sustainable Energy Projects (SEP) development and implementation while exchanging experiences and lessons learned in the process.

**Basic Steps**

There are 4 key stages towards the implementation of ENNEREG goals.

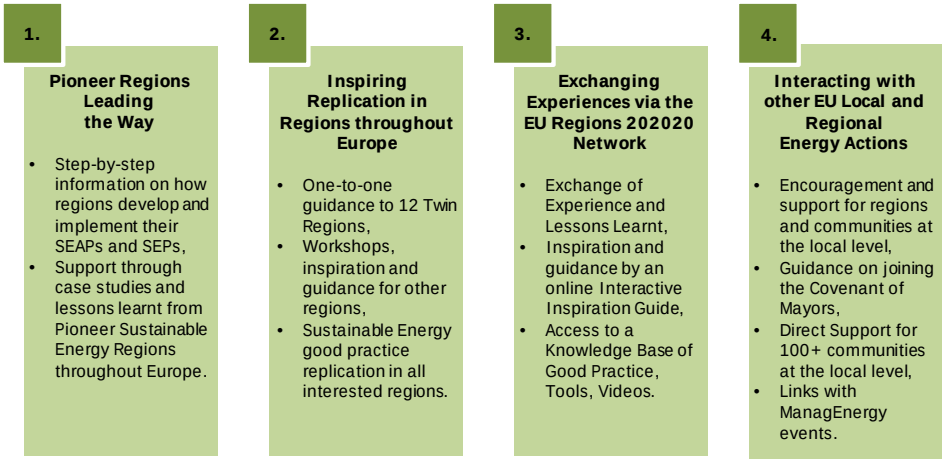


**Figure 3**. Basic Steps - ENNEREG

**Evaluation**

ENNEREG evaluation, regarding its strengths and weaknesses is presented below.

**Table 6.** Strengths and Weaknesses - ENNEREG

| Strengths | Weaknesses |
|---|---|
| • One-to-one guidance and replication of ENNEREG Region | • The differences between regions-members, especially in size and |

| | |
|---|---|
| experience in Replication Regions;<br>• Organization of many workshops with local dissemination and other events around the EU;<br>• Fully detailed EU Regions 202020 Network and Inspirational Website with past project activities, materials and results. | structures, make the creation and implementation of SEAP rather difficult;<br>• So far, undeveloped guidelines regarding SEAP implementation. |

## 3.7 ENOVA

### Introduction

ENOVA in collaboration with the Norwegian Association of Local and Regional Authorities (KS), the Norwegian Pollution Control Authority, Institute for Energy Technology (IFE) and New Energy performance AS (NEPAS) created a guidebook "Municipal Energy and Climate Planning", within the framework of ENOVA's "Norwegian Municipalities" program. This guidebook was issued in 2008 and its main goal is to comprise a tool for municipalities that aim to establish their own local energy and climate plan.

### Basic Steps

The ENOVA's process is depicted below.

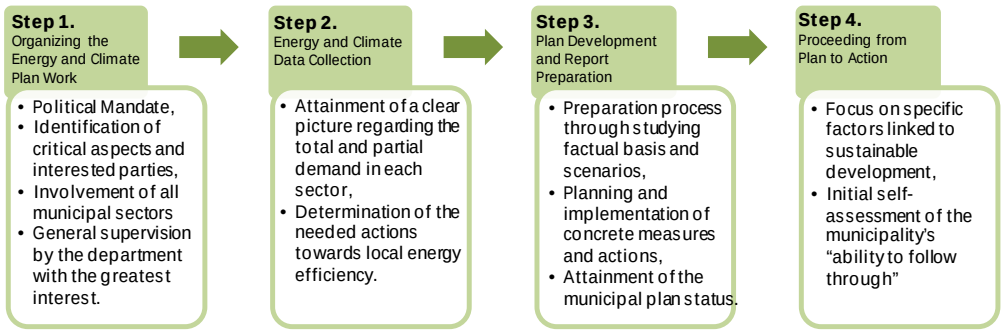


**Figure 4**. Basic Steps- ENOVA

### Evaluation

According to the JRC study (2010), the methodology's strengths and weaknesses comprise the following.

**Table 7.** Strengths and Weaknesses - ENOVA

| Strengths | Weaknesses |
|---|---|
| • Inclusion of example tables allowing the evaluation of the | • Undeveloped political agreement between the main political parties, |

| | |
|---|---|
| potential reduction on $CO_2$ emissions, analyzing the sources and gradually the progress of the actions;<br>• Provision of means towards SEAP inclusion in the general operation of the municipalities;<br>• SEAP based on the actual municipalities' general strategy;<br>• List of careful details regarding the total action plan's technical aspects;<br>• Reference provision regarding external sources. | • The measures success and the SEAP implementation are not founded on the citizenship participation;<br>• Not foreseen communication – dissemination plan to the stakeholders;<br>• Guide focused on the specific Norway situation;<br>• Lack of adequate monitoring and reporting. |

## 3.8 ENSRC

### Introduction

The Energy Self Supply in Rural Communities Project (ENSRC), supported by Intelligent Energy Europe, developed a guide to "The Formation and Operation of Energy Self Supply Co Operatives in Rural Areas", in an effort to assist those responsible for rural development to encourage rural communities in establishing energy self-supply cooperatives, in order to increase the use of sustainable energy, in the municipal level, and the promotion of alternative forms of energy and its installations.

### Basic Steps

The basic steps followed are presented below.

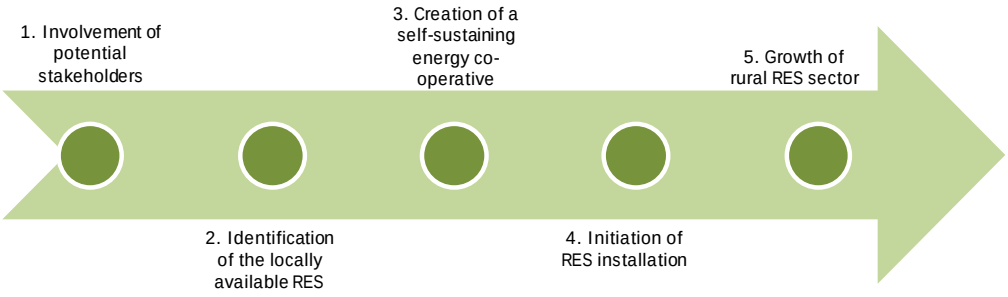


**Figure 5**. Basic Steps - ENSRC

**Evaluation**

**Table 8.** Strengths and Weaknesses - ENSRC

| Strengths | Weaknesses |
|---|---|
| • Development of self-supply energy cooperatives, calling on local renewable energy sources such as biogas, liquid biofuels, solar energy, wind and geothermal power;<br>• The guide focuses on encouraging farmers, farmer groups, local government, rural development agencies and developers to form cooperatives;<br>• Practical experience gained by project partners in establishing such cooperatives in their own region. | • Lack of guidance on gathering and monitoring data;<br>• Lack of adequate monitoring and reporting. |

## 3.9 European Energy Award

**Introduction**

The European Energy Award is a qualified instrument for steering and controlling communal energy policy in order to review systematically all energy-related activities. It supports communities that want to contribute to a sustainable energy policy and urban development through the rational use of energy and an increased use of renewable energies. To this end it offers a 6 phase methodology in order for communities to improve their performance in their energy-related activities.

**Basic Steps**

The 6 phase methodology is described below.

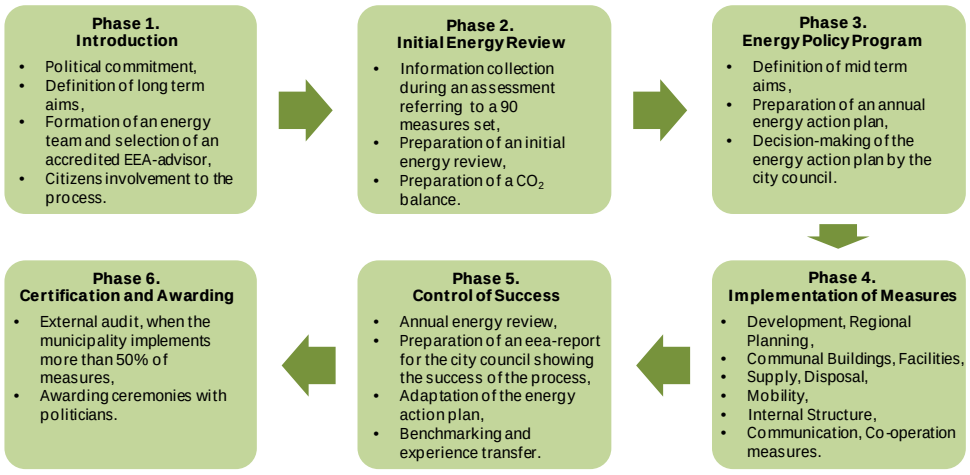


**Figure 6**. Basic Steps - European Energy Award

**Evaluation**

Strengths and weaknesses are derived from the JRC study (2010).

**Table 9.** Strengths and Weaknesses - European Energy Award

| Strengths | Weaknesses |
|---|---|
| • Focused on the success of the implementation stage;<br>• Process supported by an energy advisor;<br>• Several evaluation measures and tools;<br>• Availability of various best practice examples;<br>• Independent review of the success leading to an award;<br>• Objective external evaluation is guaranteed by an external auditor;<br>• Standardized assessment permitting a benchmarking between communities. | • Steering tools and data are not available to the public;<br>• Existence of a license fee communities have to pay to participate;<br>• The quality of evaluation depends on the skills of the energy consultants;<br>• Availability of data, tools, best practice examples strongly depends on the country and the language used. |

## 3.10 ICLEI / Natural Capitalism Solutions

**Introduction**

In 2007, ICLEI – Local Governments for Sustainability and Natural Capitalism Solutions, sponsored by Paradigm Nouveau Enterprises, issued a “Climate Protection Manual for Cities”. Main goal is to show mayors how to reduce greenhouse gas

emissions in their unique community.

**Basic Steps**

To this end, the basic steps towards reducing Greenhouse Gas (GHG) emission in a community comprise the following.

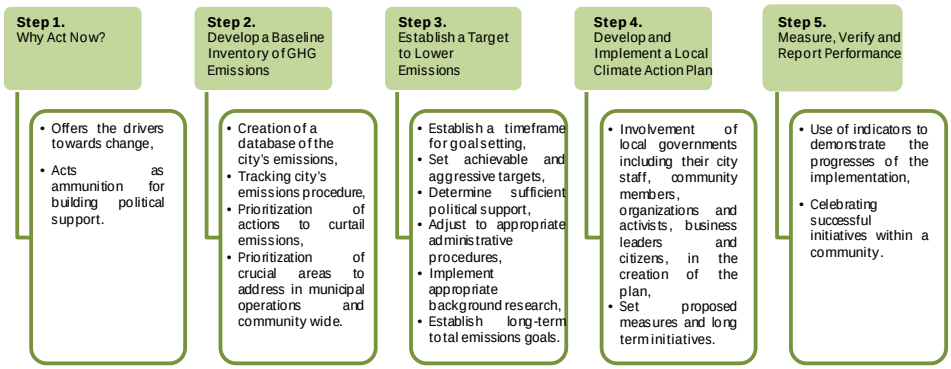


**Figure 7**. Basic Steps - ICLEI / Natural Capitalism Solutions

**Evaluation**

Taking under consideration the research implemented by the JRC study (2010), the methodology's evaluation is presented in the following table.

**Table 10.** Strengths and Weaknesses - ICLEI / Natural Capitalism Solutions

| Strengths | Weaknesses |
|---|---|
| • Indication of a variety of previous experiences, helpful towards identifying the main barriers to overcome;<br>• Existence of large amount of arguments to increase awareness among the stakeholders;<br>• Worldwide use of the methodology by ICLEI and various references to external sources. | • Not considered financial aspects;<br>• Brief research regarding the communication aspect;<br>• Little importance to benchmarking and networking. |

## 3.11 Make it Be

**Introduction**

The Decision Making and Implementation Tools for Delivery of Local and Regional Bio-Energy Plans (MAKE-IT-BE) project's main aim was the creation of a flexible and replicable methodology to support the definition of local integrated bioenergy planning (IBP) and the development of Regional Bioenergy Partnerships (RBP) in co-

operation with local and regional key actors and local authorities. To this end, within the MAKE-IT-BE duration (2008-2011) a methodology was implemented aiming to support development and implementation of integrated bio-energy chains across Europe.

**Basic Steps**

Within this framework the MAKE-IT-BE methodology process is depicted below.

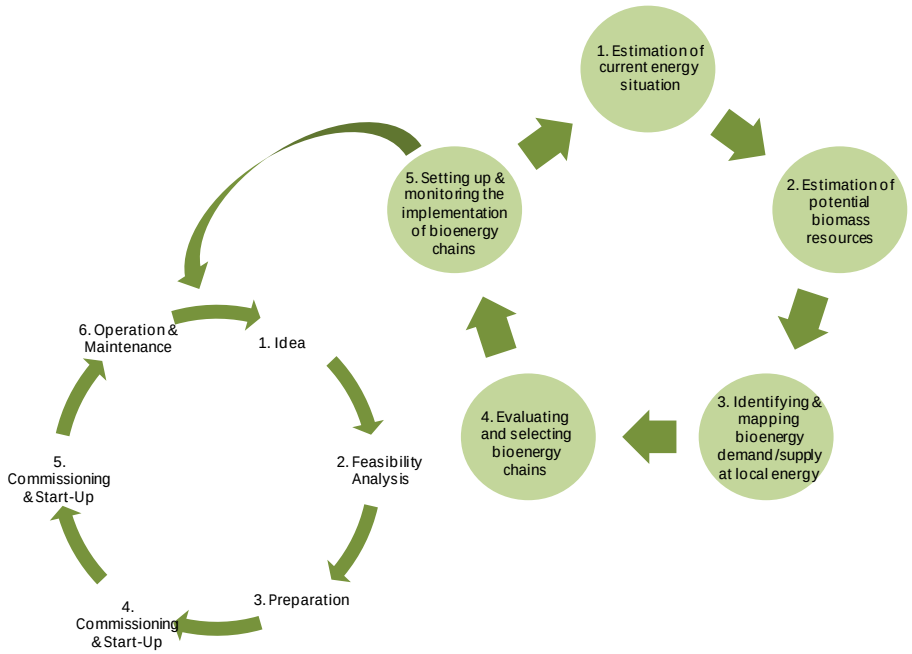


**Figure 8**. Basic Steps - Make it Be

**Evaluation**

According to the JRC study (2010) the strengths and weaknesses of the MAKE-IT-BE methodology are presented below.

**Table 11.** Strengths and Weaknesses - Make it Be

| Strengths | Weaknesses |
|---|---|
| • Consistent mapping of biomass supply and demand at a local level,<br>• Use and development of adaptable tools, such as the Food and Agriculture Organization (FAO) geographical information system methodology;<br>• Reference to different sectors involved;<br>• Involvement of different | • Various obstacles regarding the estimation of environmental, economic and social expenses and profits arising from the development of bio-energy chains;<br>• Lack of appropriate economic and organizational mechanisms, even for low budget initiatives;<br>• Lack of information and previous experiences which could result in |

| | | |
|---|---|---|
| | stakeholders, such as policy-makers, urban and energy planners, landowners, managers, administrators, traders, utilities, and end-users, | the absence of stakeholder's involvement;<br>• Inefficient incorporation of energy planning in aspects such as urban planning, agriculture management and water resources. |

## 3.12 Minnesota Project & University of Minnesota

### Introduction

In 2003, the collaboration of the Minnesota Project, the University of Minnesota's Regional Sustainable Development Partnerships and the Minnesota Department of Commerce resulted in the implementation of a clean energy resource teams manual; namely "Designing a Clean Energy Future: A Resource Manual – Developed for the Clean Energy Resource Teams". Main purpose is to offer a tool that will assist communities into shaping their energy future in a sustainable way.

### Basic Steps

Within this framework the steps towards achieving the implementation of a climate change action plan are the following:

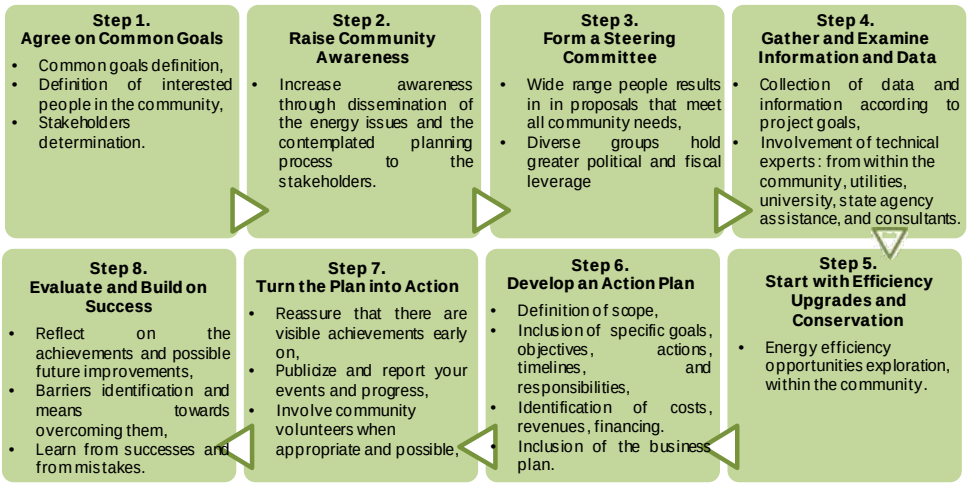


**Figure 9**. Basic Steps - Minnesota Project & University of Minnesota

### Evaluation

According to the JRC study (2010) the strengths and weaknesses of the Minnesota Project methodology are presented below.

**Table 12.** Strengths and Weaknesses - Minnesota Project & University of Minnesota

| Strengths | Weaknesses |
|---|---|
| • General overview of the SEAP | • Scarce information regarding each |

| | |
|---|---|
| design and implementation;<br>• Focused on the problematic areas of support gaining and awareness raising;<br>• Case studies of interesting previous experiences;<br>• Detailed description of each stakeholder's role;<br>• Considers both the social and the scientific perspective. | step's implementation;<br>• Important aspects such as financial issues of monitoring and reporting;<br>• More details needed for suitable use of the manual. |

## 3.13 MODEL

### Introduction

Management of Domains related to Energy in Local authorities (MODEL) is a project supported by IEE and coordinated by Energy Cities. It aims at reducing the energy gap in the European Union and beyond, by helping volunteer local authorities become models for their own citizens and other municipalities. Within this framework MODEL has set up a "Common Framework Methodology for Municipal Energy Planning" that has been implemented in 43 pilot cities from New Member States and Croatia.

### Basic Steps

Basic steps of the particular methodology are depicted below.

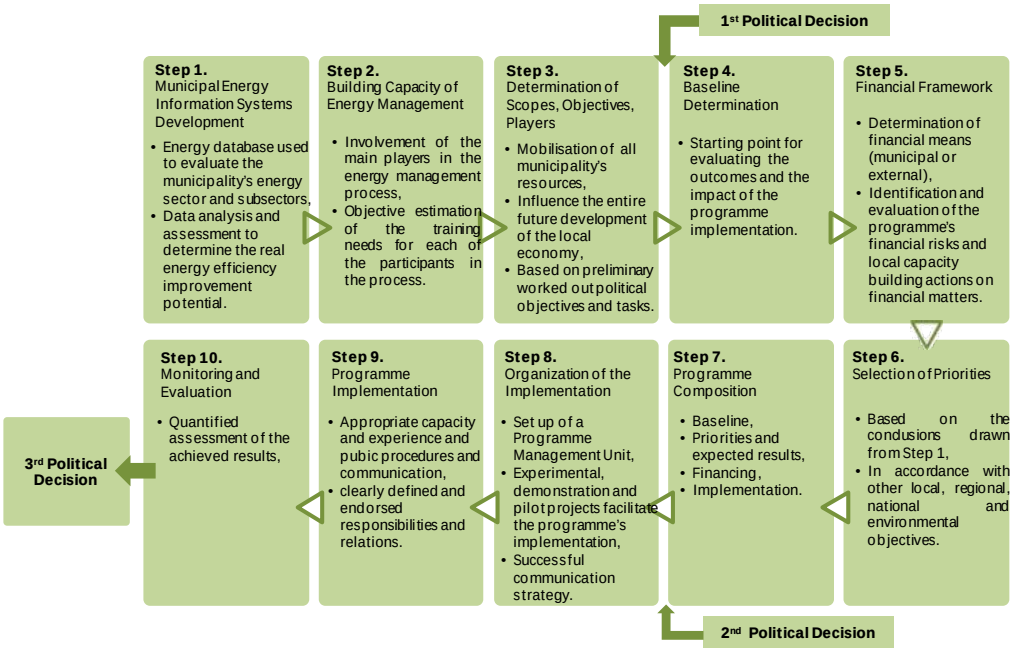


**Figure 10**. Basic Steps - MODEL

**Evaluation**

According to the JRC study (2010), MODEL's guidelines are evaluated as follows:

**Table 13.** Strengths and Weaknesses - MODEL

| Strengths | Weaknesses |
|---|---|
| • Detailed and well-structured approach, with many useful reccomendations;<br>• Large number of successful experiences, in several European municipalities;<br>• Powerful communication strategy;<br>• Available detailed inventory of funds at European level. | • The possibility of exchanging experiences with the other municipalities is not included;<br>• Unnecessary vision step in the particular methodology;<br>• Lack of analysis regarding the key-aspects which contributed to the previous successful expierences. |

## 3.14 Moving Sustainably Project

**Introduction**

Under the Baltic Sea Region INTERREG III B project BUSTRIP (Baltic Urban Sustainable Transport Implementation and Planning) framework, a Guide to Sustainable Urban Transport Plans (SUTP) – Moving Sustainably was developed within 2007-2011. The guide exists in 8 languages, while its main objective is to provide urban planners and decision-makers with tools and guidance for transport and means towards planing and implementing sustainable urban transport.

**Basic Steps**

The basic steps of the Sustainable Urban Transport Plans guide are presented below.

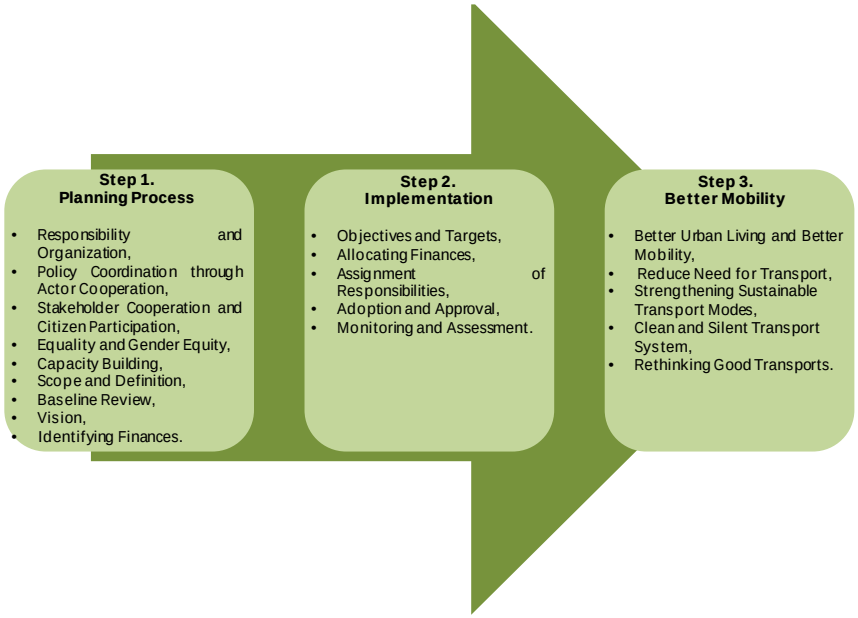


**Figure 11**. Basic Steps - Moving Sustainably Project

**Evaluation**

According to the JRC study (2010), the evaluation of the Moving Sustainably guide is explained below.

**Table 14.** Strengths and Weaknesses - Moving Sustainably Project

| Strengths | Weaknesses |
|---|---|
| • Adequate explanation of each step, including instructions on the implementation;<br>• Check list given for each step;<br>• Provision of various successful experiences, exhibiting the each step's implementation;<br>• Effective involvement of the main stakeholders;<br>• Provision of external references. | • Not detailed communication strategy;<br>• Unconsidered benchmarking and experiences transfer with other municipalities. |

## 3.15 MUSEC

**Introduction**

The Multiplying Sustainable Energy Communities – A Blueprint for Action (MUSEC) project is supported by the IEE and was implemented within 2009. Its main objective is to develop and implement a Sustainable Energy Community (SEC) strategy in seven European communities in Italy, Bulgaria, Germany, Denmark and the

Netherlands. To this end a process description on how to develop a SEC strategy was developed.

## Basic Steps

The processes' basic steps are depicted below.

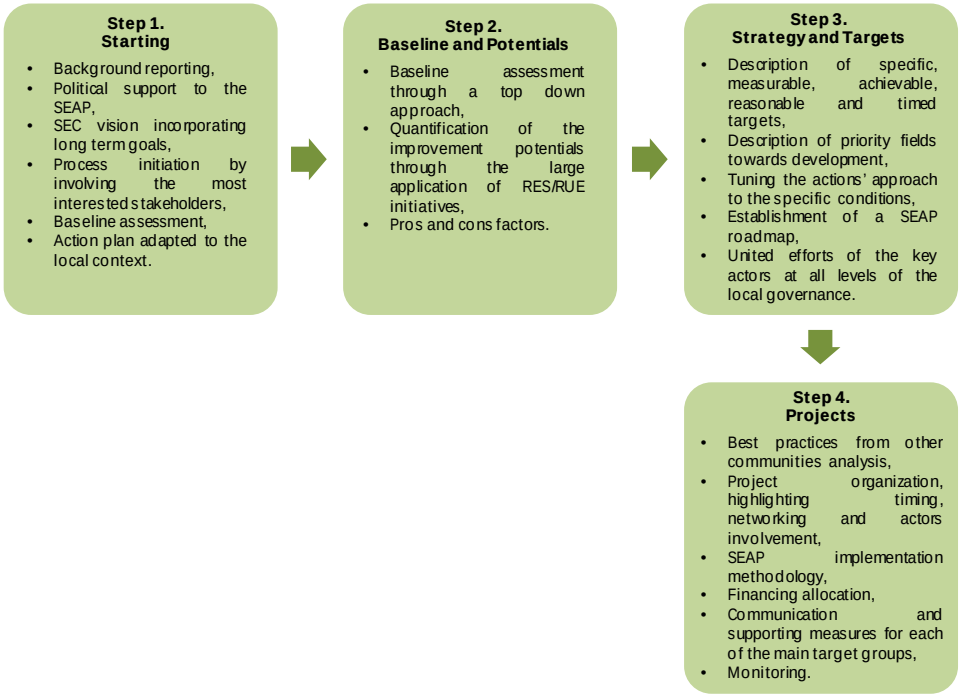


**Figure 12**. Basic Steps - MUSEC

## Evaluation

The processes' evaluation according to the JRC study (2010) is presented in the following table.

**Table 15.** Strengths and Weaknesses - MUSEC

| Strengths | Weaknesses |
|---|---|
| • Inclusion of tips and practices, based on the practical experience of the developers, which facilitate the implementation process;<br>• Detailed explanation of the processes' basic steps;<br>• The Guide offers communities solutions to several problems and assists towards the creation of their own sustainable energy community strategy. | • Underdeveloped dissemination and communication aspects;<br>• Absence of professional tools for monitoring. |

## 3.16 PEPESEC

### Introduction

The PEPESEC "Energy Planning Guidance" was realized in 2008 within the framework of the "PEPESEC - Partnership Energy Planning as a tool for realising European Sustainable Energy Communities" supported by IEE.

### Basic Steps

The main steps of the methodology are described below.

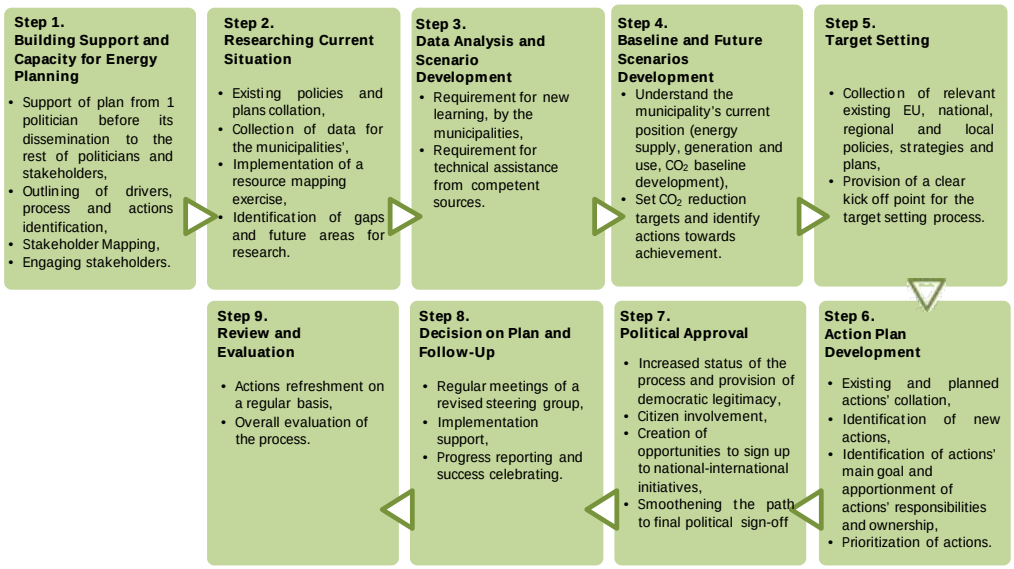


**Figure 13**. Basic Steps - PEPESEC

### Evaluation

According to the JRC study (2010), the methodology's evaluation is described below.

**Table 16.** Strengths and Weaknesses - PEPESEC

| Strengths | Weaknesses |
|---|---|
| • Methodology applied in 9 cities in Sweden;<br>• Methodology shared with European partners in an IEE project;<br>• All steps comprise real application examples;<br>• Creation of a "knowledge sharing network" on sustainable energy communities, | • Undistinguished differences regarding measures implementation within the public and private sector;<br>• Unconsidered parameters of financial aspects (investment plan proposal, resources estimation);<br>• Lack of benchmarking and experiences exchange integration in the procedure;<br>• Absence of technical steps development. |

## 3.17 SEC Tools

### Introduction

A core part of the action Sustainable Energy Communities Tools (SEC Tools), a project supported by the IEE Programme, concerned the elaboration of generic tools, a 'Toolbox' with a view to encourage qualified sustainable energy thinking and practice. The SEC-Toolbox aims at guiding and supporting various stakeholders along the process of planning and developing a SEC.

### Basic Steps

The main steps of SEC-Toolbox are the following:

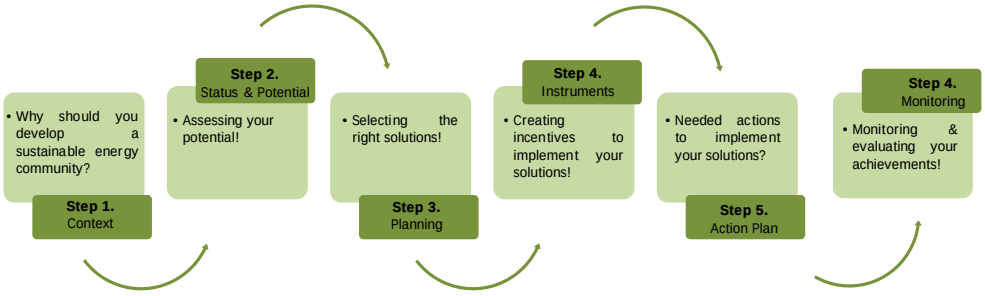


**Figure 14**. Basic Steps - SEC Tools

### Evaluation

**Table 17.** Strengths and Weaknesses - SEC Tools

| Strengths | Weaknesses |
|---|---|
| • Elaboration of a generic Toolbox with proven, well described tools for sustainable energy communities ready to adapt in communities at broad scale;<br>• Specific actions in the pilot communities within the three axes of Sustainable Energy Communities (local energy planning, activation of the energy market and end-user mobilization). | • Best practice examples strongly depend on the country and the language used. |

## 3.18 Secure Project

### Introduction

The Sustainable Energy Communities in Urban Areas in Europe (SECURE) project,

supported by IEE and concluded in 2008, implemented energy action plans in order to transform city districts (Malmö, Dublin, Hilleröd and Tallinn) to ecological sustainability. The plans focus on the long-term transformation of the energy systems within these cities, transforming them to ecological sustainability with a reduced use of energy, an increased use of renewable energy and a reduction of the environmental impacts of transport.

**Basic Steps**

The Basic steps of the methodology followed for the implementation of these action plans is depicted below.


**Figure 15**. Basic Steps - Secure Project

**Evaluation**

According to the JRC study (2010), the methodology's evaluation is presented in the following table.

**Table 18.** Strengths and Weaknesses - Secure Project

| Strengths | Weaknesses |
|---|---|
| • Guide manual available online;<br>• Simple process that can be used as a first approach towards SEAP elaboration;<br>• Inclusion of a number of campaigns to the public enhancing awareness and knowledge on RES and ENEF measures. | • Unconsidered aspects such as monitoring and targeting;<br>• Important lack of details regarding all methodology's aspects;<br>• Difficulties of small companies to adjust to the carbon trading scheme. |

## 3.19 Toolbox of Methodologies on Climate and Energy

### Introduction

The Toolbox of Methodologies on Climate and Energy developed was developed by the Capacity building of local governments to advance Local Climate and Energy Action – from planning to action to monitoring" (Covenant CapaCITY), the European Sustainable Energy Communities – effective Integrated Local Energy Action today (SUSTAINABLE NOW) and the ENERGY for MAYORS project, in support of the CoM's initiative.

### Basic Steps

The Toolbox collection contains many different types of examples, in different languages, of useful methodologies and tools, including documents, presentations, weblinks, videos and other guidance material (games, etc.).

### Evaluation

According to the above, the methodology's evaluation is presented in the strengths and weaknesses table below.

**Table 19.** Strengths and Weaknesses - Toolbox of Methodologies on Climate and Energy

| Strengths | Weaknesses |
|---|---|
| • Integrated web toolbox providing access to corresponding information, including other methodologies and good practices;<br>• With a simple external structure and search function (by language or alphabetical) it uses icons to present "elements" typically part of a SEAP development process. | • Implementation difficulties in small municipalities. |

## 3.20 Wise Plans

### Introduction

"Wise-plans: Co-operation between Communities for Energy Action Plans", a project co-funded by the European Commission aiming at delivering SEAPs for more effective use and management of energy resources in communities of four countries: Wales, Italia, Swerige and España. Through the action's implementation (2006-2007) general guidelines in order to elaborate and adopt SEAPs were implemented.

**Basic Steps**

Based on the above the general guidelines' basic steps are briefly described below.

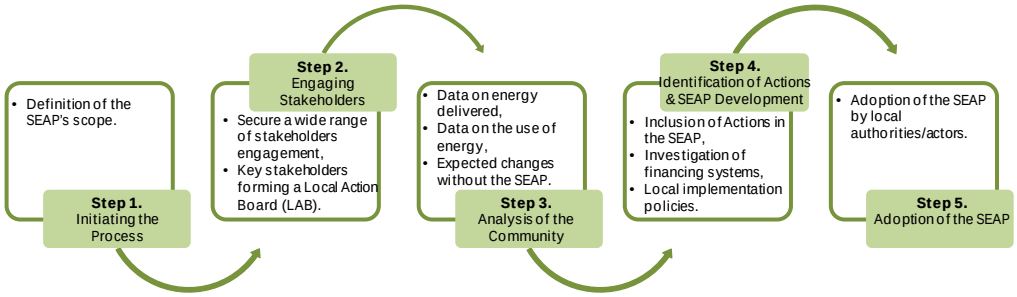


**Figure 16**. Basic Steps - Wise Plans

**Evaluation**

According to the above the methodology's evaluation is presented in the strengths and weaknesses table below.

**Table 20.** Strengths and Weaknesses - Wise Plans

| Strengths | Weaknesses |
|---|---|
| • Simple process, easily adopted and adjusted to any interested community;<br>• Engagement of a wide range of stakeholders;<br>• General overview of the SEAP implementation;<br>• Detailed information regarding the community data to be collected;<br>• Provision of templates to be included in the SEAP. | • Scarce information regarding each step's implementation;<br>• Lack of information regarding important aspects such as financial issues, monitoring and reporting;<br>• Underdeveloped communication and dissemination aspects;<br>• More details needed for suitable use of the guidelines;<br>• Unavailability of best practice examples and case studies. |

## 3.21 100-RES-COMMUNITIES

**Introduction**

"Towards 100% RES rural communities (100-RES-COMMUNITIES)" project, supported by Intelligent Energy Europe, aims at implementing new SEAPS in learning rural communities and evaluating already implemented SEAPs in advanced rural communities. It also encourages sharing experiences between experienced and learning communities built on the successful implementation of European Rurener network. Eventually, guidelines for a successful SEAP implementation will be

prepared for mass dissemination.

**Basic Steps**

The methodology "100%-RES-COMMUNITIES" consists of the following 5 basic steps:

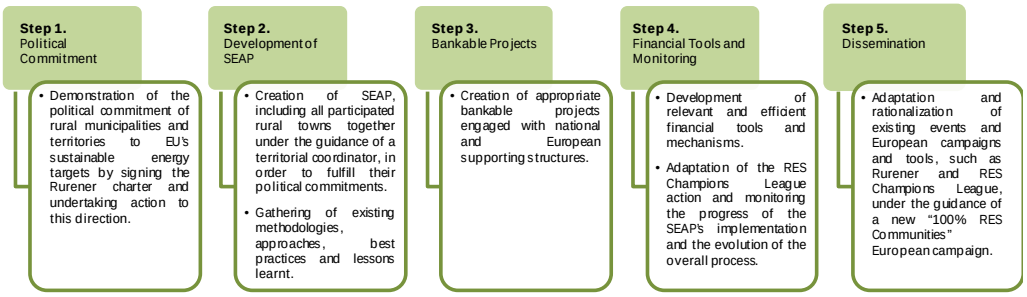


**Figure 17**. Basic Steps - 100-RES-COMMUNITIES

**Evaluation**

Because the methodology is at an early stage, the strengths and weaknesses have not yet been recorded.

## 3.22 Discussion

Some of the key parameters, affecting the rural communities in the development of their SEAPs, which are not addressed by the existing methodologies, are the following:

- The rural (fishery, forestry, agriculture) sector consumptions, which are a significant share of the communities' consumption, and are generally addressed through the tertiary sector installations;
- The less significant role of industry and the usual small contribution of public transport;
- The heavier reliance on private transportation;
- The smaller number of engaged stakeholders, which allows for a different decision making process;
- The different options available for RES/RUE technologies.
- The rural communities are not served by good infrastructure, such as lack of grids (e.g. natural gas), older and less efficient buildings, although on the other hand they have better potential for district heating etc.

Therefore, based on the detailed review of the abovementioned methodologies, the following points can be noted:

- Focused on urban territories, overlooking the special characteristics of rural communities.
- Emphasizing on specific SEAP's sectors, such as urban transportation (rail, buses

etc) and industry.

- Do not offer an integrated framework for the SEAPs development and especially the selection of sustainable RES/RUE technologies customized to the rural communities' characteristics.

In this context, there is the need for a methodology, appropriately customized to the rural communities' characteristics, addressing especially the interested stakeholders who are not "experts" in the field, saving resources and time. Indeed, the methodology should be a useful instrument towards strengthening of learning local communities and the development of SEAPs, taking into consideration the lack of technical capacity and the limited human and financial resources of the rural communities.

In particular, the eReNet customized methodology will support the communities to the following:

- Development and implementation of SEAPs (e.g. measures to be implemented, indicators linked to specific technical and/or organizational measures, monitoring);
- Elaboration of baseline $CO_2$ emission inventory at municipal level (boundaries, sectors, emission factors, calculations);
- Financial evaluation of selected SEAP actions.

It should be clearly stated that eReNet does not propose a new methodology for SEAPs' elaboration, but utilizes the best elements of existing SEAPs' methodologies and tools, in an integrated methodology, customized to the rural communities' characteristics.

A detailed description of the eReNet customized methodology is presented in the following section 4.

# 4. eReNet Customized Methodology

The general philosophy of the eReNet customized methodology is presented in Figure 18. The contribution of the eReNet customized methodology is highlighted with the "green" color in the following figure. The main steps of the methodology are based on the CoM's guidelines and the available SEAP methodologies and tools developed in the past under other IEE initiatives (PEPESEC, MODEL, MUSEC, etc.), taking also into consideration the specific characteristics of the rural communities.

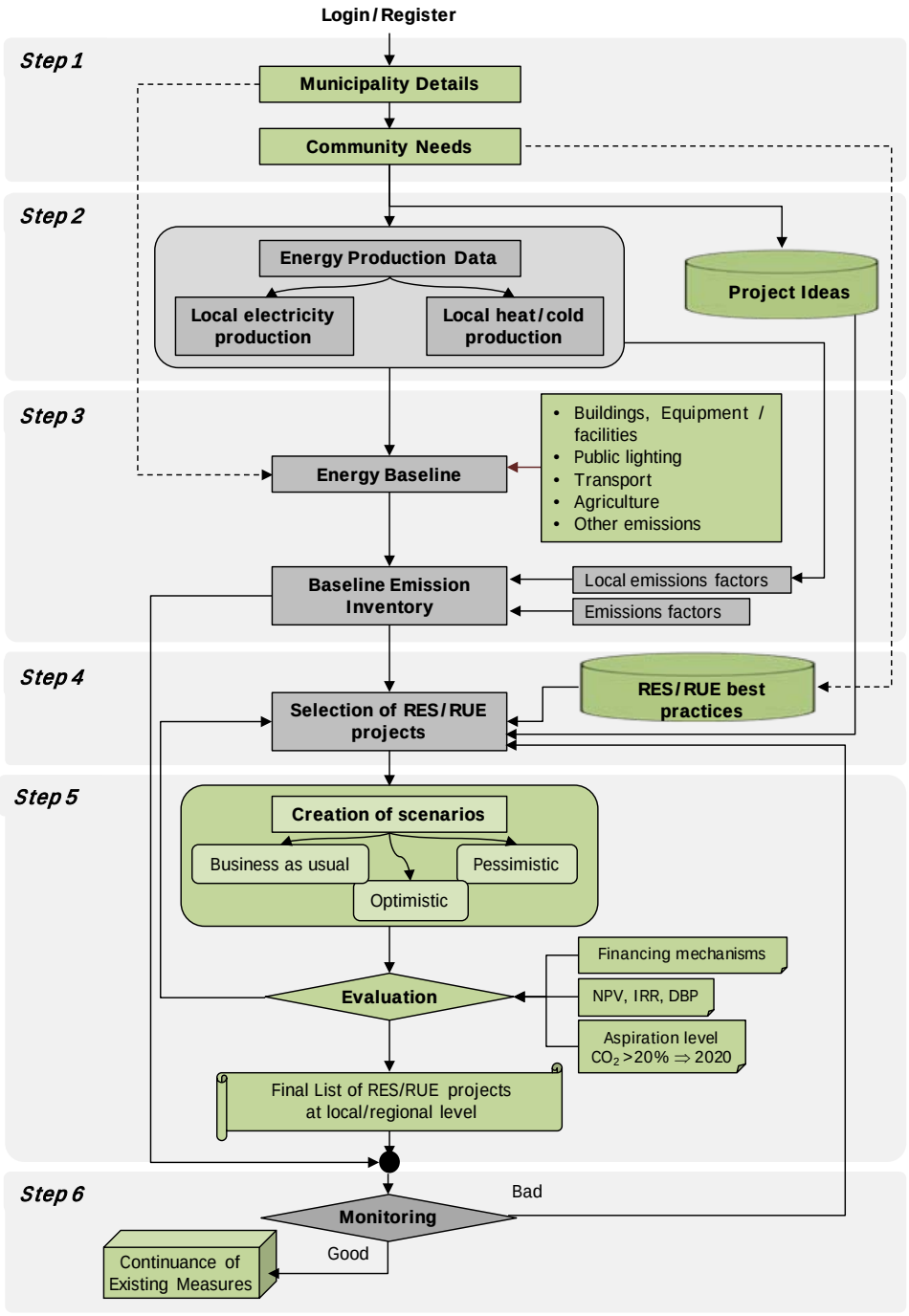


**Figure 18**. eReNet Customized Methodology

It should be noted that, the methodology incorporates all the comments and feedback received from the experienced partners on sustainable energy planning (EAO, BSERC, REGEA, IrRADIARE, NEUMARKT) during the implementation of consultation e-meetings:

- *1st Consultation e-Meeting:* Presentation of the draft methodology for the development of a SEAP customized to the rural communities' characteristics, as well as the discussion about data acquirement methods and problems in the participating countries per sector (more details can be found in Annex I);
- *2nd Consultation e-Meeting:* Detail presentation of the "Energy Baseline" methodology by NTUA, as well as discussion about the main approaches for data entry in Greece, Austria, Croatia, Bulgaria, Portugal and Germany. Short discussion about the key differentiation parameters of the rural communities based on "D2.2: Survey Results from Sustainable Energy Activities at a Local Level" (more details can be found in Annex II);
- *3rd Consultation e-Meeting:* Discussion about the final version of the energy baseline and the main approaches for data entry. The participants provided also fruitful comments and feedback as regards stakeholders' engagement in the decision making process and database with RES/RUE best practice (more details can be found in Annex III);
- *4th Consultation e-Meeting:* Discussion about the Deliverable 2.3 "Identification of Local Needs and Priorities" and the structure of the eReNet web tool. Finally, the contribution of relevant parameters to the projected energy consumption for each sector was examined (more details can be found in Annex IV).

The eReNet customized methodology consists of 6 basic steps as described in the following sections.

## 4.1 Step 1: Mapping the rural community's characteristics and needs

This step includes the following:

- *Municipality details:* Basic facts about the community (population and housing statistics, land use statistics, waste data), providing an overview of the community characteristics (Figure 19). The population and housing statistics can be used in Step 3, for the energy consumption estimation.

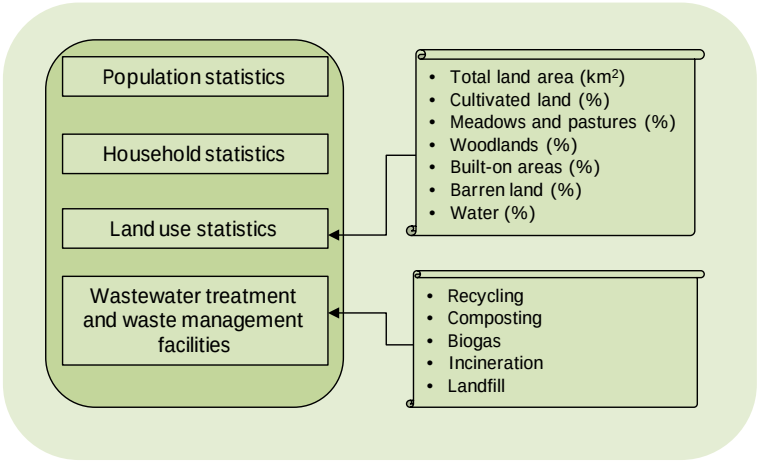


**Figure 19**. Municipality details

- *Community needs:* Information about the general climatic characteristics (e.g. temperature, wind speed, solar radiation, etc), as well as indication (with "√" in the checklist) of the RES/RUE actions of interest/ priority in the region (wind, hydro, RUE actions in municipal buildings etc) (Figure 20). These data are used in Step 4 for the prioritization of the alternative RES/RUE best practices according to the community needs.

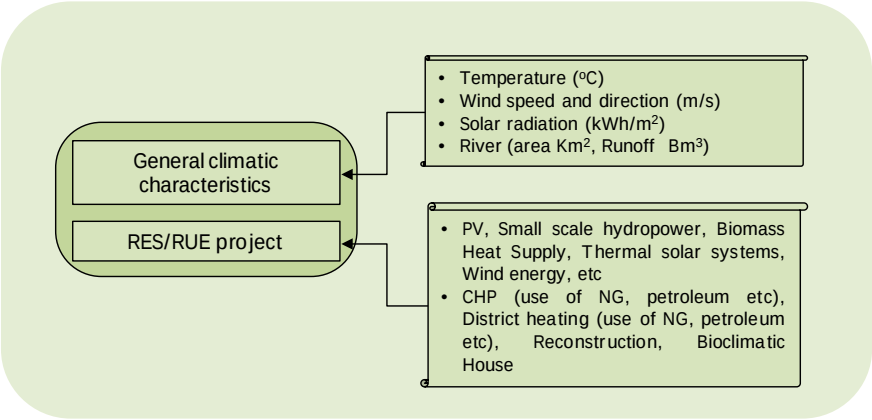


**Figure 20**. Community Needs

## 4.2 Step 2: Energy, GHG emissions and promising RES/RUE projects registry

Step 2 includes energy production data and project ideas, as follows:

- *Energy production data:* Development of an energy registry of the already operating thermal power stations, RES and selected RUE (co-generation, district heating etc) projects in the region. Direct on-line completion of these forms by the related energy companies or their completion by the municipality's personnel in charge of this task. Based on the collected data, the local emission factor for electricity and heat/cold will be calculated.

In particular, the methodology incorporates the following algorithms for the calculation of local emission factor for electricity and heat/cold, according to the CoM's guidelines:

*Calculation of local emission factor for Electricity*

***EFE = [(TCE – LPE – GEP) * NEEFE + CO2LPE + CO2GEP] / (TCE)***

- ***EFE*** *= local emission factor for electricity [t/MWhe]*
- ***TCE*** *= total electricity consumption in the local authority (as per Table A of the SEAP template) [MWhe]*
- ***LPE*** *= local electricity production (as per table C of the template) [MWhe]*
- ***GEP*** *= green electricity purchases by the local authority (as per Table A) [MWhe]*
- ***NEEFE*** *= national or European emission factor for electricity [t/MWhe]*
- ***CO2LPE*** *= $CO_2$ emissions due to the local production of electricity (as per table C of the template) [t]*
- ***CO2GEP*** *= $CO_2$ emissions due to the production of certified green electricity purchased by the local authority [t]*

*In the exceptional case where the local authority would be a net exporter of electricity, then the calculation formula would be:*

***EFE = (CO2LPE + CO2GEP) / (LPE + GEP)***

*Calculation of local emission factor for Heat/Cold*

***EFH = (CO2LPH + CO2IH – CO2EH) / LHC***

- ***EFH*** *= emission factor for heat [t/MWhheat]*
- ***CO2LPH*** *= $CO_2$ emissions due to the local production of heat (as per table D of the template) [t]*
- ***CO2IH*** *= $CO_2$ emissions related to any imported heat from outside the territory of the local authority [t]*
- ***CO2EH*** *= $CO_2$ emissions related to any heat that is exported outside of the territory of the local authority [t]*
- ***LHC*** *= local heat consumption (as per table A) [MWhheat]*

- *Project ideas:* Identification of promising RES/RUE projects for the development of the apposite registry (Figure 21). The provided information will be used in Step 4 for the selection of RES/RUE projects by the local authorities.

***Thermal Power stations***

| Project name | Installed capacity (MW) | Locally energy produced (MWh) | Investment cost (€) |
|---|---|---|---|
| | | | |

***Local Electricity Production***

| Local Electricity Production | Installed capacity (MW) | Locally energy produced (MWh) | Investment cost (€) |
|---|---|---|---|
| Wind power | | | |
| Hydroelectric power | | | |
| Photovoltaic | | | |
| Combined Heat and Power units (fuel type? use of biomass, natural gas, petroleum) | | | |
| Other | | | |

***Local Heat/Cold Production***

| Local Heat/Cold Production | Installed capacity (MW) | Locally energy produced (MWh) | Investment cost (€) |
|---|---|---|---|
| Combined Heat and Power (fuel type? Use of biomass, natural gas, petroleum) | | | |
| District Heating plant | | | |
| Other | | | |

**Figure 21**. Promising RES/RUE projects

## 4.3 Step 3: Developing energy and GHG emissions baselines

The user can choose among eReNet customized methodology and existing SEAPs' methodologies and tools (indicatively ENOVA and MODEL) for the development of the Baseline Emission Inventory.

- *Other methodologies:* Web development of the technical approach suggested by other methodologies (indicatively ENOVA and MODEL). The user should also provide the relevant data for the development of the Baseline Emission Inventory.

- *eReNet customized methodology:* A common technical approach has been adopted, as well as the necessary algorithms for the calculations of the energy and GHG emissions baseline have been developed. It should be noted that specific emphasis has been given in the sectors of agriculture, forestry and fishery, taking into consideration that these sectors constitute an important part of the Baseline Emission Inventory of the rural communities. The main aim is to facilitate the calculation of energy consumption per sector (especially for tertiary sector, residential buildings, private and commercial transport, agriculture, etc), providing alternative calculation methods to the users.

  Indeed, the approach used for the data entry regarding all buildings and facilities' energy consumptions is either based on existing aggregated data for a specific type of facilities (e.g. schools), either on the bottom up approach and/or use of appropriate estimations where considered necessary. It should be noted that, during the Consultation e-Meetings the partners from NTUA, EAO, REGEA,

IrRADIARE, BSERC and NEUMARKT provided information about the data acquirement methods and problems in the participating countries per sector.

For example, the adopted approach for the residential buildings is presented in the following table:

*Residential buildings*

- *Total energy consumption (aggregated data).*
- *Energy consumption at district level (estimation based on population or building square meters' ratio).*
  - *Energy consumption at district level, calculation of the residential consumption based on the community/ district population or building square meters' ratio.*
- *Individual energy consumptions.*
  - *Electricity consumption*
    - *Estimation and bottom up approach based on the number and area ($m^2$) of detached houses and block of apartments and average electricity consumption in buildings (kWh/$m^2$). The electricity consumption may or may not include consumption for space heating (depending on the availability of indicator data).*
  - *Space heating*
    - *Estimations and bottom up approach based on:*
      - *Area ($m^2$) and number of detached houses and apartments blocks with and without central heating,*
      - *Number of buildings with thermal insulation, for the categories with and without central heating,*
      - *Average energy consumption for heating (kWh/$m^2$), for buildings with and without central heating,*
      - *Indicators regarding the % of each fuel (e.g. diesel, natural gas, electricity, etc) in the heating energy mix,*
      - *Especially for biomass, since rural communities are studied, indicators for the average use of fuelwood (tons per household) and number of households are used.*
      - *District heating aggregated data (from the suppliers).*
  - *Water heating*
    - *Solar collectors (Solar collectors' installation - $m^2$ and energy saving through solar collectors - KWh/$m^2$ for each country).*
- *Combination of the energy consumption at district level and bottom up approach*
  - *Electricity consumption estimation*
    - *Electricity consumption at district level, calculation of the municipality consumption based on the population of community and district ratio.*

- *Use of the total area of all buildings in the residential area ($m^2$) at district level and average electricity consumption indicator ($kWh/m^2$). Calculation of the municipality consumption based on the population of community and district ratio.*

o *Space heating*

- *Use of the total area of all buildings in the residential sector ($m^2$) at district level and average energy consumption for heating ($kWh/m^2$). Calculation of the municipality consumption based on the population of community and district ratio. Use of indicators regarding the % of each fuel (e.g. diesel, electricity, natural gas, biomass etc) in the heating energy mix.*
- *District heating aggregated data (from the suppliers).*

o *Water heating*

o *Solar collectors (Solar collectors' installation - $m^2$ and energy saving through solar collectors - $KWh/m^2$ for each country).*

## 4.4 Step 4: Stakeholders' engagement in the decision making process and RES/RUE priorities' identification

This step includes the following:

- For the selection of the key stakeholders in the municipality, a list of stakeholders has been developed, as presented in Figure 22. In addition, A series of activities for the stakeholders' engagement has been identified, based on the relevant initiatives within the framework of Intelligent Energy Europe, namely PEPESEC, BELIEF, MODEL, SECURE, etc.

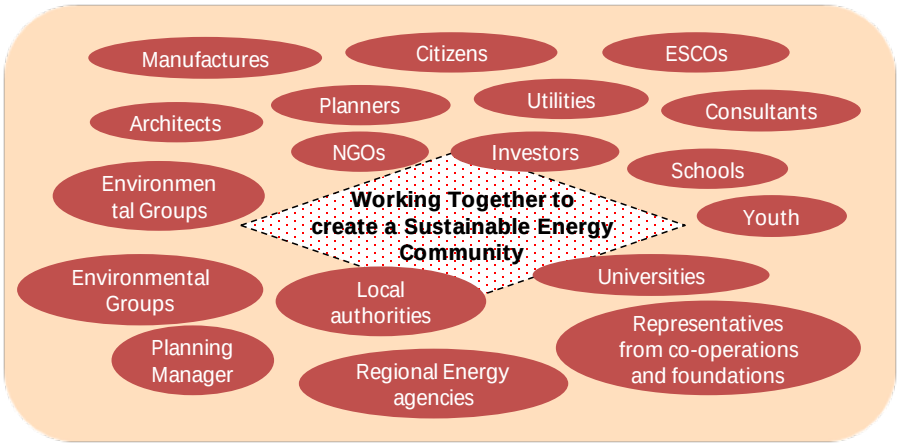


**Figure 22**. eReNet Customized Methodology

- Database with the alternative RES/RUE best practices for rural communities, based on existing SEAP methodologies and tools, that have already been developed, also in other IEE initiatives, as well as existing SEAPs accepted within the CoM framework.

More than 100 alternative RES/RUE best practices have been identified from PEPESEC, MUSEC, SEC Tools, Network of small rural communities of energetic neutrality (RURENER), RES and RUE Stimulation in Mountainous - Agricultural Communities towards Sustainable Development (Mountain RES/RUE), managEnergy etc, as presented in Figure 23.

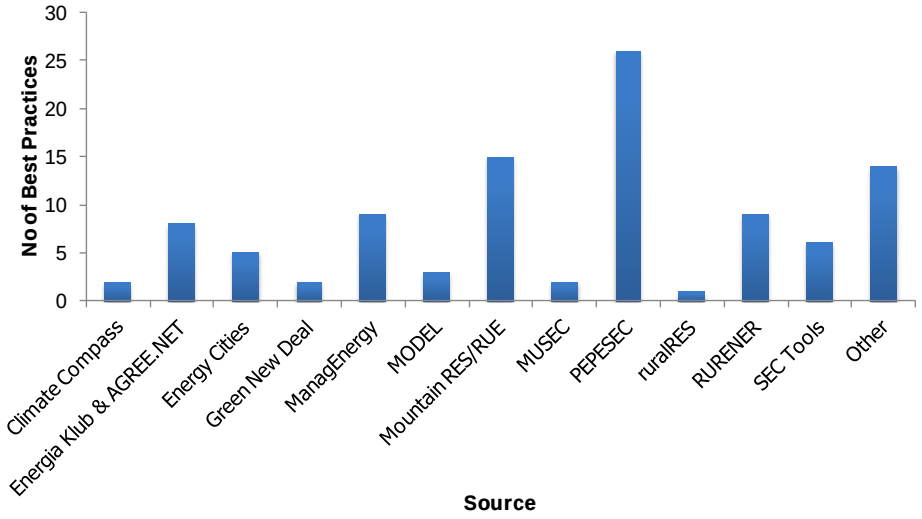


**Figure 23**. Sources of the RES/RUE Best Practices

Moreover, the number of RES/RUE best practices per project types is presented in Figure 24.

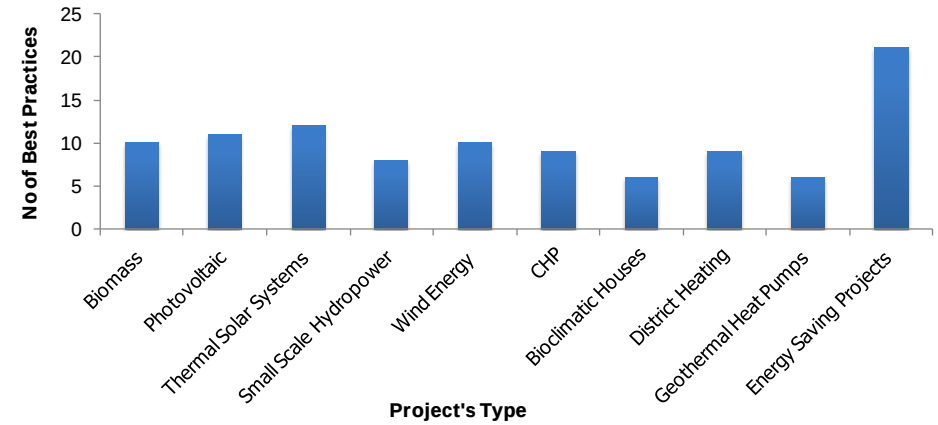


**Figure 24**. RES/RUE Best Practices per Project Type

- The user can choose among the RES/RUE best practices database and the identified RES/RUE projects' registry (Step 2). The user will have the possibility to modify the related data (installed capacity, amount of energy production or energy savings etc), thus supporting the users in the identification of major opportunities for interventions, in order to facilitate the local authorities' energy and climate strategy (quantitative objectives for establishing the medium and long term energy vision).

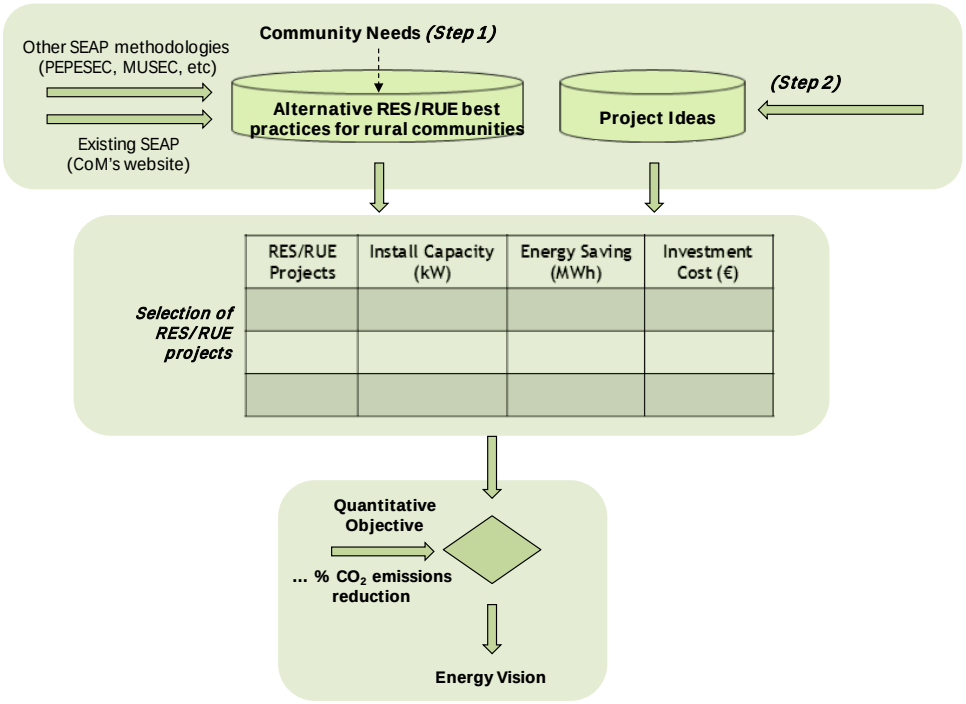


**Figure 25**. Energy Vision

## 4.5 Step 5: Scenario analysis and identification of bankable RES/RUE options

Based on the projections for a series of parameters (indicatively the community's population growth, personal income, etc), alternative scenarios ("Business As Usual – BAU", "Economic Prosperity Scenario" and "Economic Recession Scenario") have been developed. More specifically, these scenarios present the growth of the community's energy demand and $CO_2$ emissions by the year 2020, in order to evaluate whether the selected combination of actions is concerned enough to achieve the target of at least 20% $CO_2$ reduction by 2020.

The required data at national level for the development of the related algorithms are the following:

- Rate of population growth at national level by 2020;
- Rate of electricity and fuels prices by 2020;
- Rate of energy consumption growth by 2020 of the tertiary, residential, industry, transport and agriculture sector;
- Rate of per capita gross domestic product by 2020;
- Annual heating and cooling degree days.

Table 21 presents the key parameters for each sector (tertiary, residential, transport, agriculture/forestry/fishery and industry sector). However, each parameter has a different weight on the projected energy consumption. Indeed, some parameters have greater importance in the evolution, for example in Amyntaio the tertiary

sector. To this end, the level of contribution of each parameter to the projected energy consumption is based on the partners' suggestions, during the implementation of the Consultation e-Meetings. More specifically, the partners were asked to provide their preferences for the level of contribution of each parameter. An average has been calculated from these values.

**Table 21.** Contribution of each Parameter to the Projected Energy Consumption

| | Tertiary | Residential | Industry | Transport | Agriculture/ Forestry/Fishery |
|---|---|---|---|---|---|
| Rate of population growth at municipal level | 20% | 35% | - | 35% | 30% |
| Rate of per capita gross domestic product at municipal level | 35% | 25% | - | 15% | - |
| Annual heating and cooling degree days at municipal level | 10% | 10% | - | - | - |
| Rate of electricity and fuel prices | 10% | 10% | 40% | 20% | 20% |
| Rate of energy consumption growth of the relevant sector at national level | 25% | 20% | 60% | 25% | 50% |
| Development of the road network | - | - | - | 5% | - |

More analytically, the key parameters and related algorithms for each sector (municipal, tertiary and residential, etc) are presented below:

*Municipal buildings, equipment/facilities*

*The projected energy consumption of the municipal buildings, equipment and facilities is estimated by the aggregation of the energy consumption of each category (schools, municipal buildings and equipment/facilities), taking also into consideration the following parameters:*

- *Schools: Rate of population growth (age 0-19) at municipal level;*
- *Municipal buildings: Stable energy consumption;*
- *Equipment/facilities: Rate of population growth at municipal level.*

*Tertiary or Residential Sector*

*The projected energy consumption of the tertiary or residential sector is estimated by the relevant energy consumption in the baseline year, in combination with a number of local parameters and the rate of energy consumption growth at national level adjusted to the municipal level, as follows:*

- *Rate of population growth at municipal level;*

- *Rate of per capita gross domestic product growth at municipal level, taking also into consideration a correction factor;*
- *Annual heating and cooling degree days at municipal level multiplied by the rate of per capita gross domestic product growth at municipal level and divided by the heating and cooling degree days at national level, respectively;*
- *Rate of electricity and fuels prices, taking also into consideration a correction factor;*
- *Rate of energy consumption growth by 2020 of the tertiary sector at national level adjusted to the municipal level, according to the following parameters.*
  - *Per capita gross domestic product at municipal level divided by per capita gross domestic product at national level;*
  - *Annual heating degree days at municipal level divided by annual heating degree days at national level, taking also into consideration the rate of per capita gross domestic product growth at municipal level;*
  - *Annual heating degree days at municipal level divided by annual heating degree days at national level, taking also into consideration the rate of per capita gross domestic product growth at municipal level.*

*It should be noted that the impact of the population growth is considered higher in the residential sector compared to the tertiary sector. On the other hand, the per capita gross domestic product growth will contribute significantly in the projected energy consumption of the tertiary sector. Moreover, the annual heating degree days have increased impact on the projected energy consumption for heating (heating oil, natural gas, etc), while the annual cooling degree days contribute significantly to the projected electricity consumption.*

*Public Lighting*

*The rate of population growth at municipal level is the key parameters.*

*Industries*

*The projected energy consumption of the industry sector is estimated by the energy consumption in the baseline year, in combination with the rate of electricity and fuels prices and the rate of energy consumption growth by 2020 of the industry sector at national level.*

*Municipal Fleet or Public Transport*

*The projected energy consumption of the municipal fleet is considered stable.*

*Private and Commercial Transport*

*Similar to the tertiary or residential sector, the projected energy consumption of the transport sector is estimated by a number of local parameters and the rate of energy consumption growth at national level, as follows:*

- *Rate of population growth at municipal level;*
- *Rate of per capita gross domestic product growth at municipal level, taking also*

*into consideration a correction factor;*

- *Rate of fuels prices, taking also into consideration a correction factor;*
- *Rate of energy consumption growth by 2020 of the transport sector at national level, adjusted to the municipal level according to the per capita gross domestic product at municipal level divided by per capita gross domestic product at national level and a correction factor;*
- *Development of the road network.*

*Agriculture/Forestry/Fishery*

*The rates of population growth at municipal level, electricity and fuels prices, as well as energy consumption growth by 2020 of the agricultural sector are the key parameters, taking also into consideration the relevant correction factors.*

*Example*

*The projected electricity consumption in the tertiary sector is estimated by the combination of the following parameters, namely population growth (1), per capita gross domestic product (2), annual heating and cooling degree days (3), rate of electricity and fuels prices (4) and energy consumption growth by 2020 of the tertiary sector at national level adjusted to the municipal level (5):*

$$EC_{Tepr} = 20\%\ EC_{Te} \times (1 + PG) + \quad //\ 1$$

$$35\%\ EC_{Te} \times (1 + GDP_{pc} \times a) + \quad //\ 2$$

$$10\%\ EC_{Te} \times [1 + (15\%\ GDP_{pc} \times HDD_M / HDD_N + 85\% \times GDP_{pc} \times CDD_M / CDD_N)] + \quad //\ 3$$

$$10\%\ EC_{Te} \times (1 - P_e \times b) + \quad //\ 4$$

$$25\%\ EC_{Te} \times [1 + ECG \times (1 + 50\%\ GDP_{pcM/N} + 10\%\ GDP_{pc} \times HDD_{M/N} +$$

$$40\%\ GDP_{pc} \times CDD_{M/N}) \times c] \quad //\ 5$$

- $EC_{Tepr}$ *: Projected electricity consumption in the tertiary sector*
- *PG : Rate of population growth at municipal level*
- $EC_{Te}$ *: Electricity consumption of the tertiary sector*
- $GDP_{pc}$ *: Rate of per capita gross domestic product at municipal level*
- *a : Correction factor*
- $HDD_M$ *: Annual heating degree days at municipal level*
- $CDD_M$ *: Annual cooling degree days at municipal level*
- $HDD_N$ *: Average value of annual heating degree days at national level*
- $CDD_N$ *: Average value of annual cooling degree days at national level*
- $P_e$ *: Rate of electricity price*

- *$P_f$ : Rate of heating oil or natural gas price*
- *b : Correction factor*
- *ECG : Rate of energy consumption growth of the tertiary sector at national level*
- *$GDP_{pcM/N}$ : Per capita gross domestic product at municipal level / Per capita gross domestic product at national level*
- *$HDD_{M/N}$ : Annual heating degree days at municipal level / Average value of annual heating degree days at national level*
- *$CDD_{M/N}$ : Annual cooling degree days at municipal level / Average value of annual cooling degree days at national level*
- *c : Correction factor*

*The results of these scenarios (BAU Scenario, Economic Prosperity Scenario and Economic Recession Scenario) will be presented as diagrams in the apposite web forms, developed for this purpose, as presented in the following figures.*

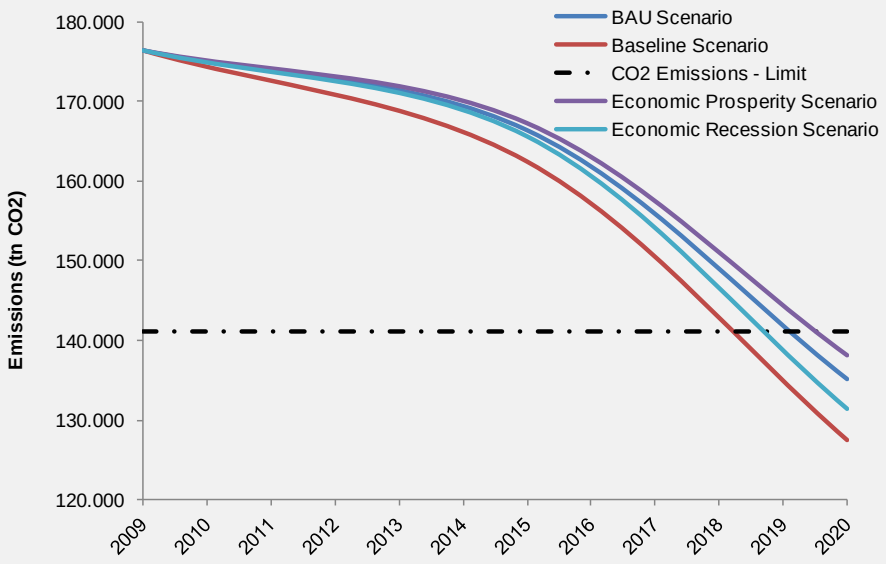


***Figure 26.*** *Scenario Analysis – Emissions*

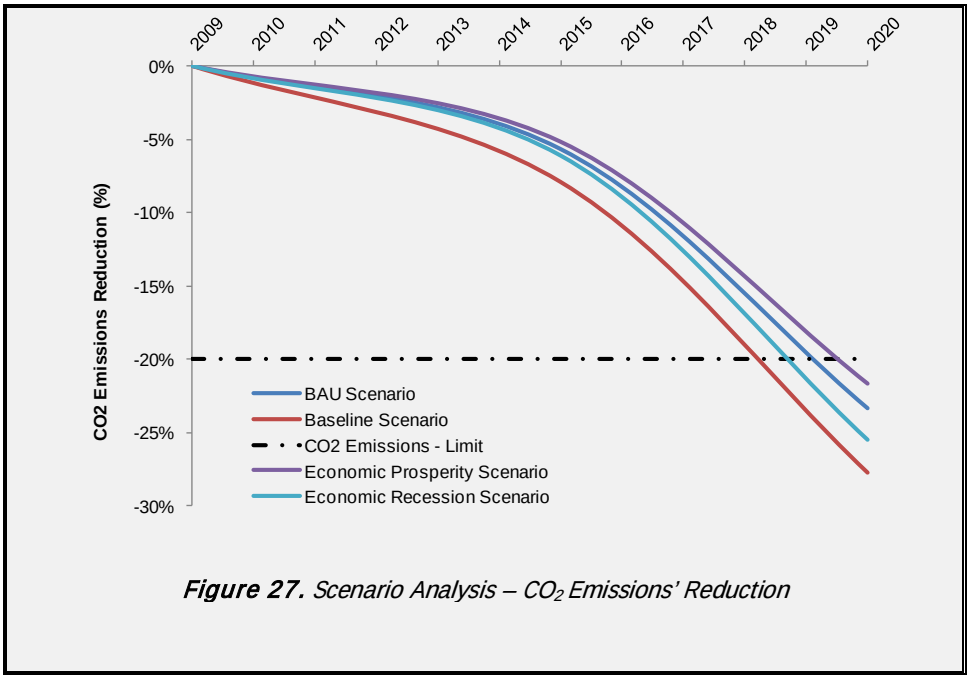


***Figure 27.*** *Scenario Analysis – $CO_2$ Emissions' Reduction*

Financial feasibility assessment of potential bankable RES/RUE projects through the development of web forms for the financial data entry and of the algorithm for the calculation of a series of financial indicators (NPV, IRR, DBP). These web forms will also take into consideration the possibility of developing these projects under different financing mechanisms (loans, subsidies, third party financing). This financial assessment will also allow the stakeholders to select the most promising options to include them under the local or national structural funds.

## 4.6 Step 6: Monitoring

The final step includes the monitoring of the overall procedure. During this step, the user will provide updated data about the energy production and energy consumption per sector. In this way, the new GHG emissions will be compared with the initial GHG emissions of the Baseline Emission Inventory. In this context, the user will identify if the proposed targets are being successfully achieved, so the selected actions should continue or further measures should be taken.

The monitoring procedure will be based on the guidelines by COMO, to be publicly available in 2013.

## 4.7 References


- Bertoldi P., Cayuela D.B., Monni S., Raveschoot R.P. (2009). Existing Methodologies and Tools for the Development and Implementation of Sustainable Energy Action Plans (SEAP). Covenant of Mayors
- Swan L.G., Ugursal V. I. 2009. Modeling of end-use energy consumption in

the residential sector: A review of modelling techniques. Renewable and Sustainable Energy Reviews, 13(8):1819-35.

- Simões S., Cleto J., Fortes P., Seixas J., Huppes G. 2008. Cost of energy and environmental policy in Portuguese $CO_2$ abatement—scenario analysis to 2020. Energy Policy, 36(9):3598-11.
- Mirasgedis S., Sarafidis Y., Georgopoulou E., Kotroni V., Lagouvardos K., Lalas D.P. 2007. Modeling framework for estimating impacts of climate change on electricity demand at regional level: Case of Greece. Energy Conversion and Management, 48(5):1737-50.
- Hainoun A., Seif-Eldin M.K., Almoustafa S. 2006. Analysis of the Syrian long-term energy and electricity demand projection using the end-use methodology. Energy Policy, 34(14):1958-70.
- del Río P., Burguillo M. (2008). Assessing the impact of renewable energy deployment on local sustainability: Towards a theoretical framework. Renewable and Sustainable Energy Reviews, 12(5):1325-1344.

# 5. Discussion - Conclusions

Based on the above analysis, the key parameters affecting the rural communities in the development of their SEAPs have been identified. Such parameters can be the rural (fishery, forestry, agriculture) sector consumptions, which are a significant share of the communities' consumption, the insignificant role of industry and the usual small contribution of public transport, the heavier reliance on private transportation, the smaller number of engaged stakeholders, which allows for a different decision making process, as well the different options available for RES/RUE technologies. Additionally, usually these communities are not served by good infrastructure, such as lack of grids for eg. Natural gas, older and less efficient buildings, although on the other hand they have better potential for district heating etc.

Rural communities possess a significant potential for RES/RUE projects implementation in order to proceed towards energy sustainability. However, it seems that this underlying potential remains largely unexploited. More specifically, the main priorities of rural communities as prerequisites for their sustainable energy development are the following:

- Continuous promotional, informative and educational measures and activities - lifelong learning actions;
- Political commitment and establishment of organizational structure in municipality administration for sustainable energy development;
- Involvement of stakeholders;
- Sustainable energy planning;
- Identification of financial instruments for RES/RUE projects implementation;
- Introduction of the system for monitoring of energy consumption and indicators on the territory of municipality.

Most of the existing methodologies and tools are focused on urban territories, overlooking the special characteristics of rural communities, emphasizing also on specific SEAP's sectors (e.g. urban transportation, industry). For instance, the agricultural sector (agriculture, forestry, fishery) distinguishes for its high energy consumptions. In this context, the eReNet customized methodology will be a very useful instrument towards strengthening of learning local communities and the development of SEAPs.